Atlantic Design Engineers, Inc.
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COMPLIANCE TEST REPORT

Cook Sterilization Facility

Ellettsville, Indiana

Submitted To:

Indiana Department of Environmental Management
Office of Air Quality
P.O. Box 6015
100 North Senate Avenue, IGCN 1003
Indianapolis, Indiana 46204

Prepared For:

Cook Incorporated
6300 North Matthews Drive
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ADE Project No. 5450.12

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COMPLIANCE TEST CERTIFICATION
Confidential Business Information

1. Certification of test report and calculations by the team leader of the personnel conducting the sampling procedures and test report author:

"I certify that the analytical procedures and data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete."

[redacted] — Zachary R. Thomas
Printed Name of Person Signing

Project Manager — 3/20/2020
Title — *Date*

2. Certification of calculations and sampling procedures by the person responsible for project QA/QC:

"I certify that the calculations were performed in accordance with the requirements of the test methods and that the data presented for use in the test report were, to the best of my knowledge and belief, true, accurate, and complete."

[redacted] — Asa Smith
Signature — *Printed Name of Person Signing*

Senior Environmental Scientist — 3/20/2020
Title — *Date*

3. Certification of test report by the senior staff person at the testing company who is responsible for compiling and checking the test report:

"I certify that this test report and all attachments were prepared under my direction or supervision in accordance with the project test protocol and that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the compliance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete."

[redacted] — Simon B. Thomas
Signature — *Printed Name of Person Signing*

Principal — 3/20/2020
Title — *Date*

1.0 COMPLIANCE TEST SUMMARY

Cook, Incorporated (Cook) operates a medical device manufacturing and sterilization operation located at 6300 North Mathews Drive in Ellettsville, Indiana (Ellettsville North). Ethylene Oxide (EO) is used at Ellettsville North to sterilize medical devices following manufacture prior to distribution. On August 30, 2019, Cook was issued a third renewal of their Federally Enforceable State Operating Permit (FESOP Renewal). The FESOP Renewal was assigned Permit ID F105-40744-00030 and expires ten years after the permit issuance date of August 30, 2019.

Cook's FESOP Renewal included a Compliance Determination requirement to complete an updated Compliance Test through performance testing of regulated emissions control equipment per Condition D.1.5. Accordingly, a Compliance Test Protocol was submitted to Indiana's Department of Environmental Management (IDEM) on December 24, 2019.

After review and approval of the Compliance Test Protocol by representatives of IDEM, a Compliance Test was completed on-site at Ellettsville North on February 6 and 7, 2020. Compliance testing incorporated each of the following control devices in accordance with Condition D.1.5. of their operating permit:

I. The one (1) primary wet acid scrubber, exhausting to stack RSV01, controlling EO emissions from the two (2) sterilization chambers S1 through S9;

II. The single non-regenerable dry bed reactor, exhausting to stack SV01, controlling back vent emissions from the seven (7) sterilization chambers S1 through S7;

III. The three (3) dry bed reactors (in parallel), exhausting to stack HV01, controlling EO emissions from the fourteen (14) aeration rooms;

The Compliance Test Protocol was designed to validate efficiency of regulated control devices and relevant site-specific operating parameters for the above listed equipment. As detailed in Condition D.1.1 of the FESOP Renewal, relevant equipment and associated operating parameters confirmed via gas chromatography are as follows:

I. A maximum concentration of 1 ppmv or at least 99% control efficiency, whichever is less stringent, for the single dry bed reactor controlling Sterilizer S1 through S7 back vents;

II. A maximum concentration of 1 ppmv or at least 99% control efficiency, whichever is less stringent, for the three (3) dry bed reactors (in parallel) controlling emissions from fourteen (14) aeration rooms[1]; and,

III. A minimum control efficiency of 99% for the primary wet acid scrubber controlling EO emissions from sterilization chamber (vacuum) vents for Sterilizer S1 through S9.

The Compliance Determination was completed 161 days after issuance of the FESOP Renewal in accordance with the 180-day testing requirement under Condition D.1.5. Additionally, this Compliance Test Report is being submitted to IDEM no later than forty-five (45) days after completion of the above-mentioned testing in accordance with Section C.9.(C) of the FESOP Renewal.

1.1 RESULTS SUMMARY

The results of the on-site emissions testing for regulated emissions control equipment demonstrated compliance with Condition D.1.1, Condition D.1.2, D.1.5 and E.1.2. of the FESOP Renewal. A summary of the results by regulated control device are provided below:

Sterilizer Chamber Vent (SCV)

Vent Type	Control Efficiency	Required	Regulatory Status
SCV Run 1 - (4 Sterilizers)	99.98%	99.00%	**In Compliance**
SCV Run 2 - (Sterilizer 8 Only)	99.99%		
SCV Run 3 - (Sterilizer 9 Only)	99.99%		
AVERAGE	**99.99%**		

AERATION ROOM VENT (ARV)

Vent Type	Control Efficiency	Required	Regulatory Status
ARV Header B– Run 1	99.93%	99.00%	**In Compliance**
ARV Header B– Run 2	99.90%		
ARV Header B– Run 3	99.86%		
AVERAGE	**99.90%**		

[1] The FESOP Renewal only regulates emissions associated with the pre-scrubber and three dry bed units utilized during aeration (Header A & Header B). The Aeration Bypass operated during room loading is voluntarily controlled

Back Vent Cycle (S1-S7) Test

Vent Type	Control Efficiency	Required	Regulatory Status
Chamber S1– Run 1	99.95%	99.00%	**In Compliance**
Chamber S3– Run 2	99.93%		
Chamber S7– Run 3	99.45%		
AVERAGE	**99.94%**		

2.0 BACKGROUND

2.1 REGULATORY

Cook's previous FESOP (Permit Number 27381) expired on August 24, 2019. Cook submitted a FESOP renewal application to IDEM on November 21, 2018. Cook was issued their FESOP Renewal on August 30, 2019 under Permit Number 40744 with an expiration date of August 30, 2029.

As part of the FESOP Renewal, IDEM implemented a requirement to complete an updated Compliance Determination within 180 days of permit issuance. The Compliance Determination Requirement also incorporated testing of Cook's regulated back vent control associated with Sterilizers S1 through S7, as detailed in Section 1.0 of this report.

A Compliance Test Protocol was submitted to IDEM on December 24, 2019. Steve Friend of IDEM confirmed that testing procedures outlined within the Compliance Test Protocol were satisfactory and Cook was authorized to schedule on-site testing. Atlantic notified Mr. Friend and the Office of Air Quality via conference call that compliance testing was scheduled for February 6, 2020.

2.2 STERILIZATION PROCEDURE

Gas sterilization is a batch process that uses a sealed chamber (sterilizer) in which non-sterile products are exposed to EO gas in order to destroy microorganisms and render the products sterile.

Since minor operational changes are continually being made to accommodate the needs of the wide variety of medical products that Cook produces and actual sterilization conditions such as contact time and temperatures vary slightly. The typical sterilization procedure currently used by Cook is described as follows:

STEP 1 - Loading

Non-sterile products from post-production packaging operations are palletized and transferred into a sterilization chamber and the door is closed. The products are preconditioned in a moist environment, readying them for sterilization. One (1) to eight (8) pallets of preconditioned products are sterilized at a time.

STEP 2 - Conditioning

The chamber is then partially evacuated, and the chamber is conditioned to optimum relative humidity and temperature. This serves to further acclimate the products to the conditions to which they will be exposed during sterilization, thus increasing the effectiveness of the process.

STEP 3 - Sterilization

Following conditioning, the sterilizer is further evacuated and charged with sterilant gas to a maximum charge density of [redacted] of EO. These conditions are maintained for an exposure period of [redacted] to completely destroy microorganisms that may be present.

STEP 4 - Air Washing

Following the exposure period, the sterilization chamber is flushed ("washed") with air multiple times to remove the sterilant gas. During air washing, the chamber is repeatedly evacuated with a sealed loop vacuum pump and then flooded with air.

STEP 5 - Back venting

Following air washing, the sterilization chamber door is "cracked" open and the back-vent blower is operated to exhaust residual EO from the chamber. [redacted] Back venting is analogous to the Sterilization Chamber Exhaust Vent cycle identified in EPA's MACT Standard.

STEP 6 - Product Transfer

During unloading of a sterilizer, the sterilizer door is left open and the back-vent blower is operated to help maintain a negative pressure in the sterilization chamber/transfer area. Maintaining a negative pressure by this means helps minimize employee exposure to EO residuals and provides greater overall control of EO emissions. This exhaust gas is discharged to the emissions control system (dry bed reactor).

Products are manually transferred via forklift from the sterilization chamber to aeration rooms. One pallet is transferred at a time. [redacted]

STEP 7 - Aeration

Sterilized products are further degassed in aeration rooms for a minimum duration of [redacted]. This step allows residual EO retained in the sterilized products to diffuse out, rendering the products essentially free of EO. Aeration room air is treated using a wet acid (pre)scrubber for the first several hours [redacted] with secondary control via dry bed reactors. For the remainder of aeration, air is discharged directly to the dry bed reactors.

2.3 STERILIZATION EQUIPMENT OVERVIEW

Please refer to Cook's Process Flow Diagram provided as Exhibit A for relevant sterilization and emissions control equipment located at Ellettsville North.

2.3.1 STERILIZATION CHAMBERS (STERILIZERS)

Facility sterilizers are designed to operate independently in a batch mode. Cook is currently permitted to operate nine (9) sterilization chambers designated as Sterilizer S1 through S9 containing internal volumes ranging from [redacted] cubic feet.

Existing Sterilizers and Chamber Capacities

Chamber Number	Internal Volume (ft^3)	Capacity (# of pallets)	Current Status
1	[redacted]	[redacted]	Operational
2	[redacted]	[redacted]	Operational
3	[redacted]	[redacted]	Operational
4	[redacted]	[redacted]	Temporarily Offline
5	[redacted]	[redacted]	Operational
6	[redacted]	[redacted]	Temporarily Offline
7	[redacted]	[redacted]	Operational
8	[redacted]	[redacted]	Operational
9	[redacted]	[redacted]	Operational

Each sterilization chamber is evacuated by a dedicated, [redacted] vacuum pump. The vacuum pumps are manifolded to deliver all evacuated gases to emission control systems.

2.3.2 AERATION ROOMS (HOT CELLS)

Ellettsville North incorporates the use of fourteen (14) aeration rooms (hot cells) to isolate and control EO off gassing from sterilized product after a sterilization cycle is completed. All aeration rooms at Ellettsville North are identical, with individual internal volumes of approximately [redacted] cubic feet and a capacity of [redacted]

Although the wet pre-scrubber in the aeration vent emission control system removes EO with an efficiency of ~85%, its principal function is to reduce the mass loading of EO to the chemisorption medium in order to increase bed life and reduce bed replacement costs. Accordingly, the wet acid pre-scrubber is not required to be tested as part of the scheduled compliance testing. As detailed in Section 1.0, Cook's FESOP only implements regulated control requirements on the three dry bed reactors utilized for aeration emission control.

2.3.3 FACILITY EMISSIONS CONTROL SYSTEMS

The emission control system for Cook's sterilization process consists of two (2) wet acid scrubbers and twenty-five (25) dry bed reactors. Nineteen (19) of the twenty-five (25) dry bed reactors installed at the facility are operated on a voluntary basis per Cook's Administrative Amendment 42357.

Cook's sterilization process utilizes a combination of wet acid scrubbing and chemisorption (dry bed reaction) to control EO emissions from the above-mentioned sterilization equipment. The wet-acid scrubbers are model ***Safe Cell II*** and the dry bed reactors model ***DR-490A.***

I. EO emissions from sterilization chamber (vacuum) vents for Sterilizers S1 through S9 are controlled by a single wet acid scrubber with an enforceable minimum control (removal) efficiency of 99% with outlet emissions routed through voluntary secondary abatement[2] using three (3) dry bed reactors in parallel with a rated control efficiency of 99%.

II. Sterilization chamber exhaust vents (back vents) from Sterilizers S1 through S7 are controlled by a single dry bed reactor with an enforceable minimum control efficiency of 99% or 1 ppmv, whichever is less stringent. Back vent emissions for Sterilizers S8 and S9 are voluntarily controlled via three (3) dedicated dry bed

[2] The three dry bed units used for secondary abatement are voluntary controls and, therefore, not required to be part of the Compliance Determination. Testing of the Primary Wet Scrubber was unaffected by the installation of the secondary abatement systems. Compliance testing was completed in an identical manner to previously completed compliance tests at Ellettsville North.

reactors in parallel with a rated control efficiency of 99% which are not required to be tested as part of Compliance Determination.

III. Aeration room (hot cell) header vents are controlled by a hybrid technology that consists of a wet acid pre-scrubber and three (3) dry bed reactor units operating in parallel with an enforceable minimum control efficiency of 99% or 1 ppmv, whichever is less stringent.

a. During pallet transfer when an aeration room door is open, an aeration bypass vent operates to draw air away from the operator and exhausts through voluntary controls consisting of three (3) dedicated dry bed reactors with a rated control efficiency of 99% which are not required to be tested as part of Compliance Determination.

IV. Various room exhaust vents continuously operate to maintain a negative pressure throughout the facility with emissions routed to voluntary control equipment consisting of five (5) groups of three (3) dry bed reactors in parallel, each with a rated control efficiency of 99% which are not required to be tested as part of Compliance Determination.

3.0 COMPLIANCE TEST OVERVIEW

On February 6th and 7th 2020, compliance testing was conducted by Atlantic and ECSi, Inc in accordance with the test protocol submitted to IDEM dated December 24, 2019 and accepted on January 29, 2020. A copy of the test protocol is included as **Appendix C** of this test report.

Atlantic Design Engineers, Inc. (Atlantic) and ECSi arrived on-site at 7:20 a.m. to begin calibration of the Gas Chromatograph following Method 18 using 1 ppm, 10 ppm and 100 ppm calibration gas. Calibration was completed by 8:30 a.m. Dan Kremer of ECSi then began inspection of testing locations, sample points, flow meters, etc. prior to initiating the first test.

Scrubber tank levels were measured at 9:15 a.m. and the levels were as follows:

- Common Tank – 74.0”
- Scrubber Tank – 102.0”
- Aeration Tank – 102.0”

Pictures and Field Reports showing sample ports, test setup and on-site equipment are provided in Appendix D of this report. Summary tables for each injection are attached as Exhibits A through F. Relevant chromatograms are provided within Appendix F.

3.1 AERATION ROOM VENT (ARV) TESTING

Two header vents are utilized during the aeration process, designated as Header A and Header B, and operate independent of the aeration bypass exhaust vent. Header A routes emissions through a wet acid pre-scrubber prior to entering dry bed reactors. Header B routes emissions directly to the above-mentioned dry bed reactors. As detailed in Section 2.4.3, the Compliance Determination only requires testing of the dry bed units utilized to control aeration emissions.

Pallet transfer of freshly sterilized product from Chambers S1, S2, S8 and S9 was initiated at approximately 9:00 a.m. in preparation for the first ARV test. Sterilized pallets were transferred to Aeration Rooms 1, 2, 8 and 9 with the ARV cycle configured to exhaust directly to Header B (dry bed units only). The first GC injection for ARV Test was completed at 9:15 a.m. and continued at five-minute intervals until completion of the three consecutive one-hour ARV tests.

Additionally, the following was noted every 60 seconds throughout each 55-minute testing period:

a. ΔP (inHg)
b. √ΔP
c. Temperature (ºF)
d. Relative Humidity

The following was collected on five minute intervals throughout each 55-minute testing period:

a. Inlet and Outlet EO concentrations

After completion of the first 55-minute ARV Test, the second testing period was initiated at 10:15 a.m. while maintaining use of Header B. The third ARV Test period was initiated at 11:15 a.m.

Please refer to Section 7.0 for results in conjunction with the attached ARV sampling summary tables and emissions calculation sheets.

3.2 SCV TESTING / PRIMARY WET ACID SCRUBBER

Compliance for the primary wet acid scrubber is determined via operation of the sterilization chamber vent (vacuum pump). The operating permit restricts operations at the facility to a maximum of four (4) sterilizers that can be simultaneously discharged to the primary wet scrubber.

Accordingly, the worst-case scenario of four (4) chamber evacuation was chosen as the first demonstration of the Primary Wet Scrubber. Sterilizers S1, S3, S8 and S9 were charged on February 6 under normal concentrations of EO and void of any pallets or product. The four chambers were simultaneously discharged and evacuated to the wet scrubber at approximately 2:02PM. Sampling of the wet scrubber outlet was completed during the 18-minute Sterilant Removal Phase with GC injections occurring each minute. The following was noted during the sampling period:

a. Ambient Moisture (percent) b. Header Stack flowrate (ft/s) c. Pressure (inHg)

d. Stack Volume (m3)

e. Ambient Temperature (Rankine)

f. Outlet Concentration of EO

g. Scrubber Liquid Level (Pre and Post test)

h. Initial EO charge by sterilizer

After completion of the four-chamber simultaneous discharge, Sterilizer S8 and S9 were recharged overnight to await independent evacuations on the following test day in accordance with the test protocol. The remaining two chambers were evacuated on February 7, 2020, starting with Sterilizer S8. The second SCV test began at 3:05PM using evacuations from Sterilizer S8 and sampling continued using approximate 1-minute intervals throughout the 18-minute Sterilant Removal Phase. The same criteria were noted as during SCV Test #1. The third SCV test began at 3:25PM using evacuations from Sterilizer S9.

See Section 7.0 for calculation of control device efficiency of the primary wet acid scrubber in accordance with 40 CFR 63.365 (b) and (c) (2).

3.3 BACK VENTS (STERILIZER S1-S7)

The existing sterilization back vents for Sterilizers S1 through S7 are controlled by a single dry bed reactor with existing monitoring and record keeping requirements established within each FESOP. However, the FESOP Renewal implemented a new requirement as part of the Compliance Determination for the single dry bed reactor controlling back vent emissions for these chambers.

40 CFR Part 63, Subpart O, does not provide test methods or procedures for chamber exhaust vents/dry beds. Accordingly, relevant methods from within the California

Environmental Protection Agency Air Resources Board (CARB) Method 431 were utilized for the basis of back vent testing.

Sterilizers S1, S3 and S7 were charged with EO with the chambers void of pallets (empty chambers). Once each chamber reached end of cycle, the back vents were initiated via opening of the chamber doors. Chambers were tested on an individual basis starting with Chamber S1 at 4:07 p.m., Chamber S3 at 4:25 p.m. and Chamber S7 at 4:46 p.m. All tests were completed on February 6, 2020.

Each back-vent cycle was completed in approximately 15-minutes. Inlet and outlet concentrations of the dry bed unit were collected via gas chromatography on one-minute intervals throughout each back-vent cycle.

3.4 TEST SEQUENCE SUMMARY

Compliance Test Summary (February 6-7, 2020)

Description	Date	Time
1. GC Calibration & Sample Line Inspections	2/6/2020	7:30 to 8:30 a.m.
2. ARV Test Run # 1 (Header B):	2/6/2020	9:15 to 10:10 a.m.
3. ARV Test Run # 2 (Header B):	2/6/2020	10:15 to 11:10 a.m.
4. ARV Test Run # 3 (Header A & B):	2/6/2020	11:15 a.m. to 12:10 p.m.
5. Sterilizer Chamber Vent Test # 1 (Simultaneous discharge from S-1, S-3, S-8 & S-9)	2/6/2020	2:04 to 2:22 p.m.
6. Back Vent Test #1 (Chamber S1):	2/6/2020	4:07 to 4:22 p.m.
7. Back Vent Test #2 (Chamber S3):	2/6/2020	4:25 to 4:40 p.m.
8. Back Vent Test #3 (Chamber S7):	2/6/2020	4:46 to 5:01 p.m.
9. Sterilizer Chamber Vent Test #2 (Chamber S8):	2/7/2020	3:05 to 3:21 p.m.
10. Sterilizer Chamber Vent Test #3 (Chamber S9):	2/7/2020	3:24 to 3:40 p.m.

4.0 TEST METHODOLOGY

EO mass-mass control efficiency and mass emissions tests were conducted in general accordance with EPA Method 18, § 8.2.2, *Direct Interface Sampling and Analysis Procedure*. A gas chromatograph was used on site to simultaneously monitor the EO concentration in the source gases upstream and downstream of the emission control device.

Exhaust stack temperature and pressure were monitored in lieu of assuming worst case moisture (3%) or standard temperature, per recommendations by IDEM. Sampling ports were located in accordance with EPA Reference Method 1. Sample locations are depicted in the equipment plan and sampling photographs located in Appendix D**.**

Flow rates were measured in accordance with USEPA Reference Method 2C using a standard pitot tube, inclined-oil manometer and thermocouple. Exhaust gas composition was assumed to be air and water vapor. The efficiency calculations for the compliance test runs were completed using the calculated 2.8% ambient exhaust moisture contents (monitored over 1-minute intervals) per the addendum to the Compliance Test Protocol submitted IDEM. The moisture content was utilized for determination of flow calculations, explained further in Section 5.6. The test calculations herein account for atmospheric conditions as the flow measurement results were converted to dscfm.

4.1 SCV SAMPLING METHODOLOGY

Outlet EO concentration and flow measurements were collected throughout each SCV Test. EO mass to the inlet of the Primary Scrubber was calculated via application of the Ideal Gas Law using Equation One in Section 5.1. Outlet concentrations from the Primary Scrubber outlet were analyzed using SRI Model 8610 portable gas chromatograph (GC) equipped with both a Photo Ionization Detector (PID) and a Flame Ionization Detector (FID).

During SCV sampling, the following were recorded for use in calculating inlet concentration:

- Initiation and termination time for each sequence,
- Sterilizer pressure (each sterilizer), at initial charge and at the end of initial post-exposure evacuation,
- Sterilizer temperature (each sterilizer), at initial charge and at the end of initial post-exposure evacuation,
- EO charge for each sterilizer.

The following conditions were established by GC analysis, flow measurements, or engineering calculations:

- Volumetric flow rate at scrubber inlet,
- Concentration of EO, in parts per million by volume (ppmv) of primary wet acid scrubber inlet gases,
- Volumetric flow rate of exhaust gases from the primary wet acid scrubber, and
- Concentration of EO, in parts per million by volume (ppmv) in exhaust gases from the primary wet acid scrubber.

Cycle Data Reports indicating the Sterilant Removal Phase timelines for sterilizers used during SCV testing can be provided upon request[3].

4.2 SCV SITE-SPECIFIC OPERATING PARAMETER

Under the Cook FESOP permit continuous compliance of the wet-acid scrubber is demonstrated through the ongoing monitoring of a site-specific operating parameter established during compliance testing.

The specified site-specific parameter to be established for the acid-water scrubber is governed by the maximum scrubber liquor tank level. The scrubber tank levels recorded during SCV testing are included in the Section 7.0.

4.3 AERATION ROOM VENTS (ARV)

An aeration room vent test was conducted to evaluate the performance efficiency of the dry bed control system while production materials are in aeration. Each aeration room has two (2) exhaust ducts.

One exhaust duct connects all aeration cells to a common manifold (Header A) which exhausts to the wet acid pre-scrubber, followed by the dry bed reactor system. The second exhaust duct connects all aeration cells to a separate manifold (Header B) that bypasses the wet acid pre-scrubber and exhausts directly to the (3) dry bed reactor system.

For this Compliance test, only Header B was tested as this header represents a worst-case scenario and does not utilize the wet acid pre-scrubber.

EO concentrations at the inlet and outlet of the ARV Header B emissions control system were simultaneously measured with a SRI, Model 8610, portable gas chromatograph (GC),

[3] Cook Cycle Data Reports are considered Confidential Business Information

equipped with dual, heated sample loops and injectors, dual columns, and dual detectors. A flame ionization detector (FID) was used to quantify emissions at the emission control device inlet where Header B exhausts, and a photo ionization detector (PID) was used to quantify emissions at the emission control device outlet.

The following data was established by on-site sampling / flow measurements:

- Concentration of EO, in parts per million by volume (ppmv) in control system inlet gases,
- Concentration of EO, in parts per million by volume (ppmv) in dry bed reactor system outlet gases, and,
- Volumetric flow rate of dry bed reactor system outlet duct.
- Moisture content in the Header B Stack

4.4 BACK VENT CYCLE (S1-S7)

40 CFR Part 63, Subpart O, does not provide test methods or procedures for chamber exhaust vents/dry beds. Accordingly, relevant methods from within the California Environmental Protection Agency Air Resources Board (CARB) Method 431 are utilized for the basis of back vent testing.

CARB Method 431 specifies that efficiency calculations can be based solely on EO concentration measurements without volumetric flow measurement as long as the following criteria are met:

- There is no dilution between the inlet and outlet sampling locations
- There is identical flow at the inlet and outlet sampling locations, and
- There is constant flow throughout the duration of the compliance test.

Accordingly, the following data was established by on-site sampling / flow measurements via CARB Method 431:

- Concentration of EO of dry bed reactor system inlet gases in parts per million.
- Concentration of EO of dry bed reactor system outlet gases in parts per million.

5.0 CONTROL-EFFICIENCY / MASS-EMISSIONS CALCULATIONS

5.1 CALCULATION OF MASS BY IDEAL GAS LAW

The inlet mass of EO from the sterilization chamber to emissions control during Sterilizer Chamber Venting was determined by using the following equation:

$$W_C = \frac{MW_{EtO} * N_{EtO} * P * V}{R * T} \quad \textbf{(Equation 1)}$$

Where:

Variable:	Description:	Unit:
W_C	Mass of EO charged	lb_m
MW_{EO}	Molecular weight of EO	lb/mol
N_{EO}	Mole fraction of EO = MW_{EO} / $M_{\%EO}$	
$M_{\%EO}$	Weight percent of EO in the sterilant gas	44.05 / $W_{\%EO}$
P	Chamber pressure	psia
V	Chamber volume	ft^3
R	Gas constant	$\frac{(psia) \cdot (ft^3)}{(mol) \cdot (^oR)}$
T	Temperature	^oR

5.2 RESIDUAL MASS CHARGE

The residual mass of EO in the sterilizer (W_R) were determined by recording the chamber temperature, pressure, and volume after the completion of the first evacuation and using the following equation:

$$W_R = \frac{MW_{EtO} * N_{EtO} * P * V}{R * T} \quad \textbf{(Equation 2)}$$

Note: Standard conditions are 68°F and 1 atm

5.3 INLET MASS TO CONTROL SYSTEM

The total mass of EO to the inlet to the control device (W_i) were calculated by subtracting the residual mass (W_R) calculated with Equation 2 from the charged weight (W_C) calculated by Equation 1.

$$\dot{W}_i = W_C - W_R \quad \textbf{(Equation 3)}$$

5.4 OUTLET MASS FROM CONTROL SYSTEM

During the sterilizer exhaust cycle, the mass of EO emitted from the control device outlet (W_{out}) was calculated by measuring the flow rate through the control device exhaust continuously during the first evacuation using procedures found in 40 CFR part 60. Flow rates were recorded at approximately one-minute intervals throughout the test cycle, taking the first reading within fifteen (15) seconds after time zero, defined at the moment when the pressure in the sterilizer is released.

The concentration of EO was determined by the application of Test Method 18 using an on-site gas chromatograph. The outlet mass flow rate (M_{out}) from the control system was calculated using the following equation:

$$\dot{W}_{out} = \frac{\dot{V} * t_C * MW_{EtO} * (\frac{1}{10^6} \cdot [EtO])}{V_{mol}} \qquad \textbf{(Equation 4)}$$

Where:

Variable:	Description:	Unit:
$\dot{V}$	Corrected volumetric flow rate @ STP	ft^3/min
t_C	Total Cycle Time	min
MW_{EO}	Molecular weight of EO	44.05 lb EO/lbmol
[EO]	EO concentration	ppm
$\frac{1}{10^6}$	Conversion factor, ppmv per "*cubic foot per cubic foot*"	
V_{mol}	Volume per pound mole @ STP	385.32 ft^3/lbmol

Equation 4 was used to calculate the inlet and outlet mass numbers for both the Primary and Secondary Aeration Room Vent Control efficiency calculations.

5.5 CONTROL DEVICE EFFICIENCY

The efficiency (η) of the control device was calculated with the following equation:

$$\eta = \frac{\dot{W}_i - \dot{W}_{out}}{\dot{W}_i} \times 100 \qquad \textbf{(Equation 5)}$$

Where:

η = *Efficiency (%)*
$\dot{W}_i$ = *Mass flow rate into the control device*
$\dot{W}_{out}$ = *Mass flow rate out of the control device*

Calculations for the above equations are attached as Exhibits A through F of this report.

5.6 VOLUMETRIC FLOW CALCULATIONS

Calculations herein account for atmospheric conditions. The efficiency calculations for the compliance test runs were completed using the average stack moisture content of 2.8%**.**

Stack volumetric flowrates ($\dot{V}$) were calculated using the following equation:

$$\dot{V} = \frac{N_{MC} * v * A * T * P}{T_1 * P_1} \qquad \textbf{(Equation 6)}$$

Where:

Variable:	Description:	Unit:
$\dot{V}$	Volumetric Flowrate	dscfm
N_{MC}	Moisture Content	2.68%
v	velocity	ft/sec
A	Stack Area	[redacted]
T	Standard Temperature	ºR
P	Standard Pressure	inHg
T_1	Stack Temperature	ºR
P_1	Stack Pressure	inHg

5.6.1 FLOW CALCULATION

The testing conditions noted during the SCV source testing are shown in the following table:

Test	Moisture Content (%)	Velocity (ft/sec)	Stack Area (m^3)	Pressure (inHg)	Temp. (ºR)
SCV Test #1	2.8%	[redacted]	[redacted]	29.05	547
SCV Test #2	2.8%	[redacted]	[redacted]	27.05	547
SCV Test #3	2.8%	[redacted]	[redacted]	29.05	547

The above values were measured on-site during testing according to the procedures outlined in **Section 4.0** to calculate Mass Flow of EO for each corresponding test. The mass flow the period of time (test period) was used to determine the total mass emissions. **Equation 4** from **Section 5.4** combines these two calculations.

A copy of these calculation sheets and velocity traverse data is included in Appendix A as well as within SCV Summary Tables in **Exhibits B-D.**

6.0 QUALITY ASSURANCE / QUALITY CONTROL

6.1 FIELD TESTING QUALITY ASSURANCE

Before the start of analytical work, a system blank was analyzed to ensure that the sampling system was free of EO. Air was drawn through the sampling system lines to the GC for analysis. After determining that the sampling system was clean, a sample of source gas was injected into the sampling system and analyzed to determine the concentration of any residual EO present in the sample.

6.2 TEST REPORT QUALITY ASSURANCE

Before submittal, this test report underwent a tiered review by Atlantic staff. A signed certification attesting to the review is presented at the beginning of the report.

1. An initial review of the report and calculations was performed by the report author / project manager.
2. A second review was performed by a colleague (staff engineer / scientist).
3. A final review was performed by the principal of Atlantic's Division of Air Quality.

6.3 CALIBRATION PROCEDURES

The calibration of all applicable manual sampling equipment generally followed the QA / QC procedures in 40 CFR 60, the EPA *Quality Assurance Handbook, Volume III, APTA0576*, and all applicable equipment manufacturers' procedures. Any variations from standard EPA test methods and sampling procedures have been noted.

Vented gases were analyzed by a SRI, Model 8610C, portable gas chromatograph (GC), equipped with dual, heated sample loops and injectors, dual columns, and dual detectors. A flame ionization detector (FID) was used to quantify emissions at the emission control device inlet, and a photo ionization detector (PID) was used to quantify emissions at the emission control device outlet.

The GC system was calibrated at the beginning and conclusion of the compliance test. Each of the calibration standards was taken from a separate, certified manufacturer's cylinder. Each of the three calibration run results were within 5% of each other satisfying requirements set forth in EPA's Method 18, § 8.2.2, *Direct Interface Sampling and Analysis Procedure*.

All calibration gases and support gases were of the highest purity and quality available. A copy of the calibration data and velocity/traverse logs are provided in Appendix A of this report.

7.0 COMPLIANCE TEST RESULTS

The following control efficiencies of the EO emission control systems for the Sterilizer Chamber Vent (SCV), Aeration Room Vents (ARV), and Back Vent Cycle Dry Beds (S1-S7) were calculated using methodology and equations throughout Section 5.0.

7.1 SCV EMISSIONS CONTROL TEST RUNS

Vent Type	Control Efficiency	Required	Regulatory Status
SCV Run 1 - (4 Sterilizers Simultaneously)	99.98%	99.00%	**In Compliance**
SCV Run 2 - (Sterilizer 8 Only)	99.99%		
SCV Run 3 - (Sterilizer 9 Only)	99.99%		
AVERAGE	**99.99%**		

Average control efficiency was calculated based on the arithmetic mean of the three test runs.

The average tested control efficiency for the EO emissions control system from the sterilization chamber vents is 99.99%.

7.2 ARV EMISSIONS CONTROL TEST RUNS

Vent Type	Control Efficiency	Required	Regulatory Status
ARV Header B– Run 1	99.930%	99.00% (or 1ppm)	**In Compliance**
ARV Header B– Run 2	99.898%		
ARV Header B– Run 3	99.866%		
AVERAGE	**99.90%**		

Average control efficiency was calculated based on the arithmetic mean of the three test runs.

The average tested control efficiency for the EO emissions control reduction system from the aeration room vents was 99.90%.

7.3 BACK VENT CYCLE (S1-S7) EMISSIONS CONTROL TEST RUNS:

Vent Type	Control Efficiency	Required	Regulatory Status
Chamber S1– Run 1	99.956%	99.00%	**In Compliance**
Chamber S3– Run 2	99.932%		
Chamber S7– Run 3	99.450%		
AVERAGE	**99.94%**		

Average control efficiency was calculated based on the arithmetic mean of the three test runs.

The average tested control efficiency for the EO emissions control reduction system from the S1-S7 back vents was 99.94%.

7.4 SCV PRIMARY WET-ACID SCRUBBER - LIQUOR LEVELS:

The wet acid liquor levels for the holding tank were measured before and after the compliance testing on February 6th and 7th. The levels of the acid within the tanks were recorded and shown below. Pictures of the tanks have also been included in Appendix D.

Tank:	Prior to Daily Tests		After Daily Tests	
	Day 1	Day 2	Day 1	Day 2
Common Tank	74”	74”	74”	74”
Scrubber Tank	102”	102”	102”	102”
Aeration Tank	102”	102”	102”	102”

EXHIBIT A

[redacted]

EXHIBIT B

SCV TEST #1 SUMMARY

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Exhaust Run #1 (Scrubber Outlet) - Chambers 1, 3, 8 & 9
Cook Medical, Inc. - Ellettsville, IN
February 6, 2020

DeltaP	SqRtDeltaP	Temp (F)	ppm EtO
0.025	0.1581	87	0.025
0.025	0.1581	87	12.6
0.025	0.1581	87	57.3
0.025	0.1581	87	83.9
0.025	0.1581	87	101
0.025	0.1581	87	106
0.025	0.1581	87	96.8
0.025	0.1581	87	92.2
0.025	0.1581	87	87.3
0.025	0.1581	87	85.0
0.025	0.1581	87	80.3
0.025	0.1581	87	77.6
0.025	0.1581	87	70.6
0.025	0.1581	87	17.2
0.025	0.1581	87.0	**69.13**
	=	547	degR

mw =	28.51	
stack area =	[redacted]	
press =	[redacted]	
Tstd =	528	
Pstd =	29.92	
Cp =	0.99	
Kp =	85.49	
Velocity =	[redacted]	ft/sec
Flow =	[redacted]	**dscfm**
MWeto =	44.05	
MolVol =	385.32	
ppmv/ft3 =	1000000	
EtO Mass Flow =	**0.0009189**	**lbs/min**
min/cycle =	20	
EtO Emissions =	**0.018377**	**lbs/cycle**
Start Time:	1404	
Stop Time:	1424	

INLET CALCULATION:

Chamber 1

Pre-Evac:	V =	[redacted]	ft3	Post-Evac:	V =	[redacted]	ft3
	P =	[redacted]	in Hg Abs		P =	[redacted]	in Hg Abs
	T =	[redacted]	degF		T =	[redacted]	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
	lbs EtO @ 100% =	49.49	lbs		lbs EtO @ 100% =	16.04	lbs

Initial EtO = Scale Wt. =	16.4	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	33.1	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	5.32	lbs
Chamber 3 Inlet EtO = Initial EtO - Final EtO =	**11.1**	**lbs**

Chamber 3

Pre-Evac:	V =	[redacted]	ft3	Post-Evac:	V =	[redacted]	ft3
	P =	[redacted]	in Hg Abs		P =	[redacted]	in Hg Abs
	T =	[redacted]	degF		T =	[redacted]	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
	lbs EtO @ 100% =	49.56	lbs		lbs EtO @ 100% =	16.02	lbs

Initial EtO = Scale Wt. =	16.2	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	32.7	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	5.23	lbs
Chamber 6 Inlet EtO = Initial EtO - Final EtO =	**11.0**	**lbs**

Chamber 8

Pre-Evac:	V =	[redacted]	ft3	Post-Evac:	V =	[redacted]	ft3
	P =	[redacted]	in Hg Abs		P =	[redacted]	in Hg Abs
	T =	[redacted]	degF		T =	[redacted]	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
	lbs EtO @ 100% =	119.94	lbs		lbs EtO @ 100% =	38.96	lbs

Initial EtO = Scale Wt. =	40.9	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	34.1	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	13.29	lbs
Chamber 8 Inlet EtO = Initial EtO - Final EtO =	**27.6**	**lbs**

Chamber 9

Pre-Evac:	V =	[redacted]	ft3	Post-Evac:	V =	[redacted]	ft3
	P =	[redacted]	in Hg Abs		P =	[redacted]	in Hg Abs
	T =	[redacted]	degF		T =	[redacted]	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
	lbs EtO @ 100% =	119.73	lbs		lbs EtO @ 100% =	38.89	lbs

Initial EtO = Scale Wt. =	41.1	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	34.3	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	13.35	lbs
Chamber 9 Inlet EtO = Initial EtO - Final EtO =	**27.8**	**lbs**
TOTAL INLET ETO =	**77.4**	**lbs**
CONTROL EFFICIENCY =	**99.9763**	**%**

EXHIBIT C

SCV TEST #2 SUMMARY

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Run #2 (Scrubber Outlet) - Chamber #8
Cook Medical, Inc. - Ellettsville, IN
February 7, 2020

DeltaP	SqRtDeltaP	Temp (F)	ppm EtO
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
Average =			
0.0050	0.0707	87.0	**0.0250**
	=	547	degR

mw =	28.51	
stack area =	[redacted]	
press =	[redacted]	
Tstd =	528	
Pstd =	29.92	
Cp =	0.99	
Kp =	85.49	
Velocity =	[redacted]	ft/sec
Flow =	[redacted]	**dscfm**
MWeto =	44.05	
MolVol =	385.32	
ppmv/ft3 =	1000000	
EtO Mass Flow =	**0.00000015**	**lbs/min**
evac start =	1505	
evac stop =	1521	
min/cycle =	16	
EtO Emissions =	**0.00000238**	**lbs/cycle**

INLET CALCULATION:

Pre-Evac:				Post-Evac:			
	V =	[redacted]	ft3		V =	[redacted]	ft3
	P =	[redacted]	in Hg Abs		P =	[redacted]	in Hg Abs
	T =	[redacted]	degF		T =	[redacted]	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
	lbs EtO @ 100% =	119.32	lbs		lbs EtO @ 100% =	38.89	lbs

Initial EtO = Scale Wt. =	40.8	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	34.2	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	13.3	lbs
INLET ETO = Initial EtO - Final EtO =	**27.5**	**lbs**
CONTROL EFFICIENCY =	**99.999991**	**%**

EXHIBIT D

SCV TEST #3 SUMMARY

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Run #3 (Scrubber Outlet) - Chamber #9
Cook Medical, Inc. - Ellettsville, IN
February 7, 2020

DeltaP	SqRtDeltaP	Temp (F)	ppm EtO
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	87	0.025
0.005	0.0707	86	0.025
0.005	0.0707	86	0.025
0.005	0.0707	86	0.025
0.005	0.0707	86	0.025
Average =			
0.0050	0.0707	86.7	**0.0250**
	=	547	degR

mw =	28.51	
stack area =	[redacted]	
press =	[redacted]	
Tstd =	528	
Pstd =	29.92	
Cp =	0.99	
Kp =	85.49	
Velocity =	[redacted]	ft/sec
Flow =	[redacted]	**dscfm**
MWeto =	44.05	
MolVol =	385.32	
ppmv/ft3 =	1000000	
EtO Mass Flow =	**0.00000015**	**lbs/min**
evac start =	1524	
evac stop =	1541	
min/cycle =	17	
EtO Emissions =	**0.00000253**	**lbs/cycle**

INLET CALCULATION:

Pre-Evac:	V =	[redacted]	ft3	Post-Evac:	V =	[redacted]	ft3
	P =	[redacted]	in Hg Abs		P =	[redacted]	in Hg Abs
	T =	[redacted]	degF		T =	[redacted]	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
	lbs EtO @ 100% =	119.73	lbs		lbs EtO @ 100% =	38.89	lbs

Initial EtO = Scale Wt. =	40.5	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	33.8	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	13.2	lbs
INLET ETO = Initial EtO - Final EtO =	**27.3**	**lbs**
CONTROL EFFICIENCY =	**99.999991**	**%**

EXHIBIT E

ARV TESTS 1-3 SUMMARY

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Cook Medical, Inc. - Ellettsville, IN
2-6-20 - Aeration Runs 1-3 - Header B

DeltaP	SqRtDeltaP	Temp (F)	ppm EtO
Run #1			
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
Run #2		Average =	0.0250
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	91	0.025
Run #3		Average =	0.0250
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	91	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
0.060	0.2449	90	0.025
3 Run Average =			
0.060	0.2449	90.4	**0.0250**

= 550 degR

mw =	28.51	
stack area =	[redacted]	
press =	[redacted]	
Tstd =	528	
Pstd =	29.92	
Cp =	0.99	
Kp =	85.49	
Velocity =	[redacted]	ft/sec
Outlet Flow =	[redacted]	**dscfm**
MWeto =	44.05	
MolVol =	385.32	
ppmv/ft3 =	1000000	

Run #1 Outlet

EtO Mass Flow =	**0.000005**	**lbs/min**
EtO Mass Flow =	**0.000319**	**lbs/hr**

Run #2 Outlet

EtO Mass Flow =	**0.000005**	**lbs/min**
EtO Mass Flow =	**0.000319**	**lbs/hr**

Run #3 Outlet

EtO Mass Flow =	**0.000005**	**lbs/min**
EtO Mass Flow =	**0.000319**	**lbs/hr**

TABLE 1
ETHYLENE OXIDE CONTROL EFFICIENCY - AERATION - HEADER B
OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE
OPERATED BY COOK MEDICAL, INC.
IN ELLETTSVILLE, INDIANA
ON FEBRUARY 6, 2020

RUN NUMBER	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
1(3)	917	30.9	0.025	99.9191
1	922	37.6	0.025	99.9335
1	927	37.8	0.025	99.9339
1	932	38.7	0.025	99.9354
1	937	40.5	0.025	99.9383
1	942	38.5	0.025	99.9351
1	947	38.2	0.025	99.9346
1	952	37.2	0.025	99.9328
1	957	35.2	0.025	99.9290
1	1002	35.4	0.025	99.9294
1	1007	29.9	0.025	99.9164
1	1012	33.6	0.025	99.9256
2(4)	1017	30.2	0.025	99.9172
2	1022	31.9	0.025	99.9216
2	1027	30.7	0.025	99.9186
2	1032	27.8	0.025	99.9101
2	1037	25.6	0.025	99.9023
2	1042	24.5	0.025	99.8980
2	1047	22.7	0.025	99.8899
2	1052	21.0	0.025	99.8810
2	1057	23.5	0.025	99.8936
2	1102	19.5	0.025	99.8718
2	1107	22.4	0.025	99.8884
2	1112	21.4	0.025	99.8832
3(5)	1117	21.8	0.025	99.8853
3	1122	21.2	0.025	99.8821
3	1127	19.7	0.025	99.8731
3	1132	19.3	0.025	99.8705
3	1137	18.6	0.025	99.8656
3	1142	17.6	0.025	99.8580
3	1147	19.2	0.025	99.8698
3	1152	18.2	0.025	99.8626
3	1157	18.7	0.025	99.8663
3	1202	17.5	0.025	99.8571
3	1207	17.4	0.025	99.8563
3	1212	16.1	0.025	99.8447
TIME-WEIGHTED AVERAGE:		**26.67**	**0.0250**	**99.8981**
			IDEM REQUIRED CONTROL EFFICIENCY:	**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.025 ppm is the quantification limit for the detector used at the outlet.
(3) - Test Run #1 started at 9:15, ended at 10:15.
(3) - Test Run #2 started at 10:15, ended at 11:15.
(3) - Test Run #3 started at 11:15, ended at 12:15.

ECSi

EXHIBIT F

BACK VENT CYCLE (S1-S7) TESTS SUMMARY

TABLE 3
ETHYLENE OXIDE CONTROL EFFICIENCY - BACKVENT
OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE
OPERATED BY COOK MEDICAL, INC.
IN ELLETTSVILLE, INDIANA
ON FEBRUARY 6, 2020

RUN NUMBER	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
1(3)	1604	1590	0.025	99.9984
1	1605	152	0.025	99.9836
1	1606	104	0.025	99.9760
1	1607	84.7	0.025	99.9705
1	1608	69.5	0.025	99.9640
1	1610	61.3	0.025	99.9592
1	1611	53.5	0.025	99.9533
1	1612	46.7	0.025	99.9465
1	1613	43.3	0.025	99.9423
1	1615	37.1	0.025	99.9326
1	1616	34.5	0.025	99.9275
1	1617	33.0	0.025	99.9242
2(4)	1625	76.3	0.025	99.9672
2	1626	459	0.025	99.9946
2	1627	52.4	0.025	99.9523
2	1628	44.6	0.025	99.9439
2	1629	40.3	0.025	99.9380
2	1630	40.4	0.025	99.9381
2	1631	36.1	0.025	99.9307
2	1632	33.5	0.025	99.9254
2	1633	30.6	0.025	99.9183
2	1635	24.8	0.025	99.8992
2	1636	22.5	0.025	99.8889
2	1638	21.9	0.025	99.8858
3(5)	1646	4.76	0.025	99.4748
3	1647	899	0.025	99.9972
3	1648	820	0.025	99.9970
3	1650	728	0.025	99.9966
3	1651	571	0.025	99.9956
3	1652	435	0.025	99.9943
3	1653	372	0.025	99.9933
3	1654	251	0.025	99.9900
3	1655	219	0.025	99.9886
3	1657	126	0.025	99.9802
3	1658	106	0.025	99.9764
3	1700	56.9	0.025	99.9561
TIME-WEIGHTED AVERAGE:		**216.1**	**0.0250**	**99.9445**
		IDEM REQUIRED CONTROL EFFICIENCY:		**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.025 ppm is the quantification limit for the detector used at the outlet.
(3) - Backvent Phase Test Run #1 started at 16:03, ended at 16:18
(4) - Backvent Phase Test Run #2 started at 16:24, ended at 16:39
(5) - Backvent Phase Test Run #3 started at 16:46, ended at 17:01

ECSi

APPENDIX A

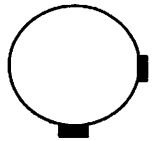
TESTING LOG SHEETS, VELOCITY & TRAVERSE DATA

ECSi - VELOCITY TRAVERSE DATA

Client: Cook Medical, Inc. Run #: 1 Date: 2/6/2020 Port Sketch:

Location: Ellettsville, Indiana Probe Type: Std Baro Press: 29.05

Source: Packed Tower Scrubber Outlet Stack I.D.: [redacted] DSCFM: [redacted]



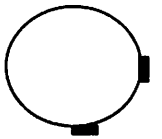
	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.2	1	0.005	0.005	0.005	0.0707	91	0	1	0.005	0.005	0.005	0.0707	91	0
0.6	2	0.01	0.01	0.01	0.1000	91	0	2	0.01	0.01	0.01	0.1000	91	0
1.2	3	0.015	0.015	0.015	0.1225	91	0	3	0.01	0.01	0.01	0.1000	91	0
2.0	4	0.015	0.015	0.015	0.1225	91	0	4	0.015	0.015	0.015	0.1225	91	0
4.0	5	0.015	0.015	0.015	0.1225	91	0	5	0.015	0.015	0.015	0.1225	91	0
4.9	6	0.01	0.01	0.01	0.1000	91	0	6	0.01	0.01	0.01	0.1000	91	0
5.4	7	0.01	0.01	0.01	0.1000	91	0	7	0.01	0.01	0.01	0.1000	91	0
5.8	8	0.005	0.005	0.005	0.0707	91	0	8	0.005	0.005	0.005	0.0707	91	0
	9							9						
	10							10						
	11							11						
	12							12						
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
								Average Values:			0.0103	0.0997	91.0	0.0

ECSI, INC. - VELOCITY TRAVERSE DATA

Client: Cook Medical, Inc. Run #: 1 Date: 2/6/2020 Port Sketch:

Location: Ellettsville, Indiana Probe Type: Std Baro Press: 29.05

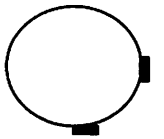
Source: Aeration Dry Bed Scrubber Inlet Stack I.D.: [redacted] DSCFM: [redacted]



	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.5	1	0.05	0.05	0.05	0.2236	97	0	1	0.05	0.05	0.05	0.2236	97	0
1.6	2	0.06	0.06	0.06	0.2449	97	0	2	0.05	0.05	0.05	0.2236	97	0
2.8	3	0.06	0.06	0.06	0.2449	97	0	3	0.06	0.06	0.06	0.2449	97	0
4.2	4	0.06	0.06	0.06	0.2449	97	0	4	0.06	0.06	0.06	0.2449	97	0
6.0	5	0.06	0.06	0.06	0.2449	97	0	5	0.06	0.06	0.06	0.2449	97	0
8.6	6	0.06	0.06	0.06	0.2449	97	0	6	0.07	0.07	0.07	0.2646	97	0
15.4	7	0.07	0.07	0.07	0.2646	97	0	7	0.07	0.07	0.07	0.2646	97	0
18.0	8	0.07	0.07	0.07	0.2646	97	0	8	0.07	0.07	0.07	0.2646	97	0
19.8	9	0.06	0.06	0.06	0.2449	97	0	9	0.06	0.06	0.06	0.2449	97	0
21.2	10	0.06	0.06	0.06	0.2449	97	0	10	0.06	0.06	0.06	0.2449	97	0
22.4	11	0.06	0.06	0.06	0.2449	97	0	11	0.06	0.06	0.06	0.2449	97	0
23.5	12	0.05	0.05	0.05	0.2236	97	0	12	0.05	0.05	0.05	0.2236	97	0
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
								Average Values:			0.0600	0.2446	97.0	0.0

ECSI, INC. - VELOCITY TRAVERSE DATA

Client: Cook Medical, Inc. Run #: 1 Date: 2/6/2020 Port Sketch:



Location: Ellettsville, Indiana Probe Type: Std Baro Press: 29.05

Source: Aeration Dry Bed Scrubber Outlet Stack I.D.: [redacted] DSCFM: [redacted]

	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.5	1	0.05	0.05	0.05	0.2236	77	0	1	0.05	0.05	0.05	0.2236	77	0
1.6	2	0.05	0.05	0.05	0.2236	77	0	2	0.05	0.05	0.05	0.2236	77	0
2.8	3	0.05	0.05	0.05	0.2236	77	0	3	0.06	0.06	0.06	0.2449	77	0
4.2	4	0.06	0.06	0.06	0.2449	77	0	4	0.06	0.06	0.06	0.2449	77	0
6.0	5	0.06	0.06	0.06	0.2449	77	0	5	0.06	0.06	0.06	0.2449	77	0
8.6	6	0.06	0.06	0.06	0.2449	77	0	6	0.07	0.07	0.07	0.2646	77	0
15.4	7	0.07	0.07	0.07	0.2646	77	0	7	0.07	0.07	0.07	0.2646	77	0
18.0	8	0.07	0.07	0.07	0.2646	77	0	8	0.06	0.06	0.06	0.2449	77	0
19.8	9	0.06	0.06	0.06	0.2449	77	0	9	0.06	0.06	0.06	0.2449	77	0
21.2	10	0.06	0.06	0.06	0.2449	77	0	10	0.05	0.06	0.055	0.2345	77	0
22.4	11	0.05	0.06	0.055	0.2345	77	0	11	0.05	0.06	0.055	0.2345	77	0
23.5	12	0.05	0.05	0.05	0.2236	77	0	12	0.05	0.05	0.05	0.2236	77	0
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
								Average Values:			0.0581	0.2407	77.0	0.0

APPENDIX B

FESOP PERMIT RENEWAL (F 105-40744-00030)

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov
Eric J. Holcomb
Governor
Bruno L. Pigott
Commissioner

Federally Enforceable State Operating Permit Renewal
OFFICE OF AIR QUALITY

Cook Incorporated
6300 North Matthews Drive
Ellettsville, Indiana 47429

(herein known as the Permittee) is hereby authorized to operate subject to the conditions contained herein, the source described in Section A (Source Summary) of this permit.

The Permittee must comply with all conditions of this permit. Noncompliance with any provisions of this permit is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. An emergency does constitute an affirmative defense in an enforcement action provided the Permittee complies with the applicable requirements set forth in Section B, Emergency Provisions.

This permit is issued in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A and contains the conditions and provisions specified in 326 IAC 2-8 as required by 42 U.S.C. 7401, et. seq. (Clean Air Act as amended by the 1990 Clean Air Act Amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

Indiana statutes from IC 13 and rules from 326 IAC, quoted in conditions in this permit, are those applicable at the time the permit was issued. The issuance or possession of this permit shall not alone constitute a defense against an alleged violation of any law, regulation or standard, except for the requirement to obtain a FESOP under 326 IAC 2-8.

Operation Permit No.: F 105-40744-00030 Master Agency Interest ID: 11774	
Issued by: Josiah K. Balogun, Section Chief Permits Branch Office of Air Quality	Issuance Date: August 30, 2019 Expiration Date: August 30, 2029

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

The notice shall include a signed certification from the owner or operator that the information provided in this notification is correct and that only Indiana licensed workers and project supervisors will be used to implement the asbestos removal project. The notifications do not require a certification that meets the requirements of 326 IAC 2-8-5(a)(1) by an "authorized individual" as defined by 326 IAC 2-1.1-1(1).

(e) Procedures for Asbestos Emission Control
The Permittee shall comply with the applicable emission control procedures in 326 IAC 14-10-4 and 40 CFR 61.145(c). Per 326 IAC 14-10-1, emission control requirements are applicable for any removal or disturbance of RACM greater than three (3) linear feet on pipes or three (3) square feet on any other facility components or a total of at least 0.75 cubic feet on all facility components.

(f) Demolition and Renovation
The Permittee shall thoroughly inspect the affected facility or part of the facility where the demolition or renovation will occur for the presence of asbestos pursuant to 40 CFR 61.145(a).

(g) Indiana Licensed Asbestos Inspector
The Permittee shall comply with 326 IAC 14-10-1(a) that requires the owner or operator, prior to a renovation/demolition, to use an Indiana Licensed Asbestos Inspector to thoroughly inspect the affected portion of the facility for the presence of asbestos.

Testing Requirements [326 IAC 2-8-4(3)]

C.9 Performance Testing [326 IAC 3-6]

(a) For performance testing required by this permit, a test protocol, except as provided elsewhere in this permit, shall be submitted to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

no later than thirty-five (35) days prior to the intended test date. The protocol submitted by the Permittee does not require a certification that meets the requirements of 326 IAC 2-8-5(a)(1) by an "authorized individual" as defined by 326 IAC 2-1.1-1(1).

(b) The Permittee shall notify IDEM, OAQ of the actual test date at least fourteen (14) days prior to the actual test date. The notification submitted by the Permittee does not require a certification that meets the requirements of 326 IAC 2-8-5(a)(1) by an "authorized individual" as defined by 326 IAC 2-1.1-1(1).

(c) Pursuant to 326 IAC 3-6-4(b), all test reports must be received by IDEM, OAQ not later than forty-five (45) days after the completion of the testing. An extension may be granted by IDEM, OAQ if the Permittee submits to IDEM, OAQ a reasonable written explanation not later than five (5) days prior to the end of the initial forty-five (45) day period.

SECTION D.1 EMISSIONS UNIT OPERATION CONDITIONS

Facility Description [326 IAC 2-8-4(10)]:

(a) Seven (7) ethylene oxide sterilization chambers, identified as S1 through S7, Sterilization chambers S1 through S6 were constructed in 1998 and sterilization chamber S7 was constructed in 2004, each using Oxyfume 2000, Oxyfume 2002 or pure ethylene oxide for sterilization, all exhausting to one (1) primary wet acid scrubber which exhausts through one (1) stack, identified as PS01, and with chamber exhaust vents (back vents) exhausting to one (1) single non-regenerable dry bed reactor which exhausts through one (1) stack, identified as SV01.

(b) Two (2) ethylene oxide sterilization chambers, identified as S8 and S9, constructed in 2012, each using Oxyfume 2000, Oxyfume 2002 or pure ethylene oxide for sterilization, each exhausting through a vacuum pump to one (1) primary wet acid scrubber which exhausts through one (1) stack, identified as PS01; and with S8 and S9 chamber exhaust vents (back vents) exhausting to three (3) non-regenerable dry bed reactors, which exhaust through one (1) stack, identified as SV02.

(c) Fourteen (14) aeration rooms, identified as HC1 through HC14, all constructed in 1998, of which zero (0) to a maximum of six (6) can exhaust through one (1) wet acid pre-scrubber and three (3) dry bed reactors (in parallel), with the remaining units exhausting solely through the three (3) dry bed reactors (in parallel), all of which exhaust through one (1) stack, identified as HV01.

[Nine (9) ethylene oxide sterilization chambers (S1-S9) and fourteen (14) aeration rooms, (HC1-HC14 are existing affected facilities under 40 CFR 63, Subpart O.]

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-8-4(1)]

D.1.1 Volatile Organic Compounds (VOC) BACT [326 IAC 8-1-6]

Pursuant to FESOP F105-8436-00030, issued on February 16, 1998, and in order to render the requirements of 326 IAC 8-1-6 (VOC Rules: General Reduction Requirements for New Facilities), the following control technology will also serve as the Best Available Control Technology (BACT) for the sterilization operations S1 through S7. The control technology used to comply with the requirements of 40 CFR 63.360 through 63.367, which apply to the sterilization process, in addition to the following:

(a) A single nonregenerable dry bed reactor to reduce ethylene oxide emissions to a maximum concentration of 1 ppmv or by at least 99 percent, whichever is less stringent, to control the seven (7) sterilization chamber exhaust vents, identified as units S1 through S7.

(b) A wet acid pre-scrubber with three (3) dry bed reactors (in parallel) to reduce ethylene oxide emissions to a maximum concentration of 1 ppmv or by at least 99 percent whichever is less stringent, to control emissions from the fourteen (14) aeration rooms.

Compliance with the above limit in this condition shall satisfy the requirements of 326 IAC 8-1-6 (New Facilities, General Reduction Requirements).

Note: The source will not be required to operate the dry bed reactor to control emissions from the sterilization chamber exhaust vents (back vents) from the two (2) sterilizers S8 and S9, approved for construction in 2012. Although S8 and S9 are not subject to the requirements of 326

IAC 8-1-6, the Permittee voluntarily installed three (3) dry bed reactors (in parallel) to reduce emissions from the back vents from sterilizers S8 and S9.

D.1.2 Hazardous Air Pollutants (HAPs) Minor Limits [326 IAC 2-8-4]

Pursuant to 326 IAC 2-8, the total ethylene oxide emissions from the nine (9) ethylene oxide sterilization chambers and the fourteen (14) aeration rooms shall be less than 9.42 tons per twelve (12) consecutive month period, total, with compliance determined at the end of each month

Compliance with the above limit, combined with the potential to emit ethylene oxide from other emission units at the source, shall limit the ethylene oxide from the entire source to less than 10 tons per year, total HAPs to less than twenty-five (25) tons per year and render the requirements of 326 IAC 2-7 (Part 70 Permits) and 326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP) not applicable.

D.1.3 Preventive Maintenance Plan [326 IAC 2-8-4(9)]

A Preventive Maintenance Plan is required for this facility and any control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements [326 IAC 2-8-4(1)]

D.1.4 VOC and HAPs [326 IAC 8-1-6][326 IAC 2-8-4]

(a) In order to assure compliance with Conditions D.1.1, and D.1.2, the primary wet acid scrubber and the single non-regenerable dry bed reactor shall be in operation and control emissions from the seven (7) ethylene oxide sterilization chambers S1 through S7 at all times the ethylene oxide sterilization chambers are in operation.

(b) In order to assure compliance with Conditions D.1.1, and D.1.2, the primary wet acid scrubber shall be in operation and control emissions from the two (2) ethylene oxide sterilization chambers S8 and S9 at all times the ethylene oxide sterilization chambers are in operation.

(c) In order to assure compliance with Conditions D.1.1, and D.1.2, the three (3) dry bed reactors with or without the wet acid pre-scrubber shall be in operation and control emissions from the fourteen (14) aeration rooms at all times the fourteen (14) aeration rooms are in operation.

D.1.5 Testing Requirements [326 IAC 2-1.1-11][40 CFR Part 63, Subpart O]

(a) Not later than 180 days after the issuance of F105-40744-00030, the Permittee shall perform test on each of the following control devices, in order to demonstrate compliance with Condition D.1.1, Condition D.1.2, and Condition E.1.2:

(1) The one (1) primary wet acid scrubber, exhausting to stack PS01, controlling ethylene oxide emissions from the two (2) sterilization chamber S8 through S9;

(2) The single non-regenerable dry bed reactor , exhausting to stack SV01, controlling ethylene oxide Chamber Exhaust Vent (CEV) emissions from the seven (7) sterilization chambers S1 through S7;

(3) The one (1) wet acid pre-scrubber and three (3) dry bed reactors (in parallel), exhausting to stack HV01, controlling ethylene oxide emissions from the fourteen (14) aeration rooms;

utilizing the procedures listed in 40 CFR 63.7 of Subpart A, the procedures listed in 40 CFR 63.363, the test methods listed in 40 CFR 63.365. During the performance test, the

owner or operator shall determine the efficiency of the control devices and the site-specific operating parameters for each of the wet acid scrubbers and the dry bed reactors. This test shall be repeated at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures).

(b) Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this condition.

Compliance Monitoring Requirements [326 IAC 2-8-4(1)][326 IAC 2-8-5(a)(1)]

D.1.6 Monitoring

To demonstrate the compliance status with the control efficiency and emission limitations requirements in conditions D.1.1, and D.1.2:

(a) For the Single Non-Regenerable Dry Bed Reactor and Three (3) Dry Bed Reactors; the Permittee shall comply with the following:

(1) Monitor and record the number of equivalent sterilization cycles performed while the bed is in service for each of the dry bed reactors; single non-regenerable dry bed reactor controlling ethylene oxide emissions from the seven (7) sterilization chamber exhaust vents (back vents) for units S1 through S7 and the three (3) dry bed reactors controlling ethylene oxide emissions from the fourteen (14) aerations rooms, identified as HC1 through HC14.

(2) Keep a record of the number of sterilization cycles run for sterilizer units S1 through S7, convert this to equivalent cycles for a 512 ft^3 sterilizer, and keep a daily running record of total equivalent cycles. The equivalent sterilization cycles shall not exceed 2,917. Each of the dry bed reactor's bed material shall be removed and replaced with fresh reactant once this maximum sterilization cycles is reached.

(3) The gas chromatography shall be calibrated, maintained and operated for measuring the outlet concentration from each of the dry bed reactor associated with sterilization chambers (S1-S7) and dry bed reactor associated with the fourteen (14) aerations rooms, identified as HC1 through HC14 once a week. In the event the on-site gas chromatograph malfunctions, arrangements will be made for interim weekly off-site analysis via gas chromatography. This does not relieve the Permittee of the responsibility to properly maintain the on-site gas chromatograph.

(b) For the Primary Wet Acid Scrubber and Wet Acid Pre-Scrubber:

The Permittee shall measure and record once per week the level of the scrubber liquor in the single recirculation tank serving both the primary wet acid scrubber controlling sterilization chamber vents and the wet acid pre-scrubber controlling aeration room vents per 40 CFR 63.364(b)(2). The Permittee shall install, maintain, and use a liquid level indicator to measure the scrubber liquor tank level (i.e. a marker on the tank wall, a dipstick, a magnetic indicator, etc.) to ensure the scrubber liquor level remains below the maximum allowable height of 84.75 inches above floor elevation.

When for any one reading the scrubber liquor level range is above the above mentioned maximum height of 84.75 inches, the Permittee shall take a reasonable response. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the response steps required by this condition. A reading that is above the above mentioned maximum liquor level is not a deviation from this permit. Failure to take

SECTION E.1 NESHAP

Emissions Unit Description:

(a) Seven (7) ethylene oxide sterilization chambers, identified as S1 through S7, Sterilization chambers S1 through S6 were constructed in 1998 and sterilization chamber S7 was constructed in 2004, each using Oxyfume 2000, Oxyfume 2002 or pure ethylene oxide for sterilization, all exhausting to one (1) primary wet acid scrubber which exhausts through one (1) stack, identified as PS01, and with chamber exhaust vents (back vents) exhausting to one (1) single non-regenerable dry bed reactor which exhausts through one (1) stack, identified as SV01.

(b) Two (2) ethylene oxide sterilization chambers, identified as S8 and S9, constructed in 2012, each using Oxyfume 2000, Oxyfume 2002 or pure ethylene oxide for sterilization, each exhausting through a vacuum pump to one (1) primary wet acid scrubber which exhausts through one (1) stack, identified as PS01; and with S8 and S9 chamber exhaust vents (back vents) exhausting to three (3) non-regenerable dry bed reactors, which exhaust through one (1) stack, identified as SV02.

(c) Fourteen (14) aeration rooms, identified as HC1 through HC14, all constructed in 1998, of which zero (0) to a maximum of six (6) can exhaust through one (1) wet acid pre-scrubber and three (3) dry bed reactors (in parallel), with the remaining units exhausting solely through the three (3) dry bed reactors (in parallel), all of which exhaust through one (1) stack, identified as HV01.

[Nine (9) ethylene oxide sterilization chambers (S1-S9) and fourteen (14) aeration rooms, (HC1-HC14 are existing affected facilities under 40 CFR 63, Subpart O.]]

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

National Emission Standards for Hazardous Air Pollutants (NESHAP) Requirements

E.1.1 General Provisions Relating to NESHAP O [326 IAC 20-1][40 CFR Part 63, Subpart A]

(a) The requirements of 40 CFR Part 63, Subpart A - General Provisions, which are incorporated as 326 IAC 20-1-1, apply to the facilities described in this section except as otherwise specified in 40 CFR 63, Subpart O.

(b) Pursuant to 40 CFR 63.10, the Permittee shall submit all required notifications and reports to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

E.1.2 Ethylene Oxide Emissions Standards for Sterilization Facilities NESHAP [40 CFR Part 63, Subpart O][326 IAC 20-5]

The Permittee shall comply with the following provisions of 40 CFR Part 63, Subpart O (included as Attachment A to the operating permit), which are incorporated by reference as 326 IAC 20-5, for the emission unit(s) listed above: as follows:

(1) 40 CFR 63.360,
(2) 40 CFR 63.361,
(3) 40 CFR 63.362,
(4) 40 CFR 63.363(a), (b)(1), (b)(2), (c), (e), (f),

APPENDIX C

COMPLIANCE TEST PROTOCOL

www.atlanticcompanies.com

Atlantic Design Engineers, Inc.
P.O. Box 1051
Sandwich, MA 02563

COMPLIANCE TEST PROTOCOL

Compliance Determination
Ellettsville North Sterilization

Submitted To:

Indiana Department of Environmental Management
Office of Air Management
P.O. Box 6015
100 North Senate Avenue
IGCN, 10th Floor
Indianapolis, Indiana 46206-6015

Prepared For:

Cook Incorporated
6300 North Matthews Drive
Ellettsville, Indiana 47429

ADE Project No. 5450.12

December 24, 2019

CONTACT SUMMARY

CLIENT CONTACTS

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Mobile: (812) 327-2966
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e-mail: shawn.adams@cookmedical.com

REGULATORY CONTACTS

Indiana Department of Environmental Management
Air Compliance & Enforcement Branch, Office of Air Quality
P.O. Box 6015
100 North Senate Avenue, IGCN 1003
Indianapolis, IN 46206-6015
Phone: (317) 233-0178
Fax: (317) 233-6865

SOURCE TESTING CONTRACTOR

Simon B. Thomas, P.E.
Project Manager
Atlantic Design Engineers, Inc.
P.O. Box 1051
Sandwich, Massachusetts 02563

Phone: 508-888-9282
Fax: 508-888-5859

TABLE OF CONTENTS

SECTION **PAGE**

ATTACHMENTS

1.0 INTRODUCTION

Cook, Incorporated (Cook) operates a medical device manufacturing and sterilization operation located at 6300 North Mathews Drive in Ellettsville, Indiana (Ellettsville North). Ethylene oxide is used at Ellettsville North to sterilize medical devices following manufacture prior to distribution. On August 30, 2019, Cook was issued a third renewal of their Federally Enforceable State Operating Permit (FESOP Renewal). The permit renewal (F105-40744-00030) expires ten years after issuance on August 30, 2029.

Cook's FESOP Renewal implements Compliance Determination Requirements via completion of performance testing for regulated emissions control equipment. A Compliance Test is required to be completed no later than 180 days after issuance of the FESOP Renewal and a Compliance Test Report must be submitted to Indiana's Department of Environmental Management (IDEM) no later than forty-five (45) days after the on-site test.

After issuance of the FESOP Renewal, Cook attended a meeting with IDEM representatives on October 16, 2019 to discuss the planned voluntary installation of additional dry bed control units at Ellettsville North to further reduce potential sources of fugitive emissions. Representatives of IDEM confirmed the proposed implementation of new equipment would not affect enforceable compliance requirements or applicable test methods currently required by their FESOP Renewal.

Accordingly, Cook recently submitted an Administrative Amendment to reflect the additional dry bed reactors within their FESOP. The abatement systems are located adjacent to the recently installed back vent controls for Sterilizers S8 & S9. Please refer to the Administrative Amendment application package currently being reviewed by IDEM for further details and we have provided the Administrative Amendment narrative as Appendix A to this protocol. *As mentioned above, this equipment is voluntary and does not affect Compliance Determination Requirements within Condition D.1.5. or Condition D.1.1. of the FESOP Renewal.*

In conjunction with Condition D.1.1 of the FESOP Renewal, this Compliance Test Protocol is being submitted at least thirty-five (35) days prior to on-site performance testing. Cook will notify IDEM at least fourteen (14) days prior to any scheduled performance testing per Condition C.9 of the FESOP Renewal.

2.0 ELLETTSVILLE NORTH STERILIZATION

2.1 Sterilization Equipment

Cook's sterilization operations consist of nine (9) sterilizers designated as Sterilizer S1 through S9 containing internal volumes ranging from [redacted] cubic feet. Ellettsville North incorporates the use of fourteen (14) aeration rooms (hot cells) to isolate and control ethylene oxide off gassing from sterilized product after a sterilization cycle is completed. All aeration rooms at Ellettsville North are identical, with individual internal volumes of approximately [redacted] cubic feet and a capacity of [redacted] pallets per cell.

2.2 Emissions Control Equipment

Cook's sterilization process utilizes a combination of wet acid scrubbing and chemisorption (dry bed reaction) to control ethylene oxide emissions from the above-mentioned sterilization equipment.

I. Ethylene oxide emissions from sterilization chamber (vacuum) vents for Sterilizers S1 through S9 are controlled by a single wet acid scrubber with an enforceable minimum control (removal) efficiency of 99% with outlet emissions routed through voluntary secondary abatement using three (3) dry bed reactors in parallel with a rated control efficiency of 99%.

II. Sterilization chamber exhaust vents (back vents) from Sterilizers S1 through S7 are controlled by a single dry bed reactor with an enforceable minimum control efficiency of 99% or 1 ppmv, whichever is less stringent. Back vent emissions for Sterilizers S8 and S9 are voluntarily controlled via three (3) dedicated dry bed reactors in parallel with a rated control efficiency of 99%.

III. Aeration room (hot cell) header vents are controlled by a hybrid technology that consists of a wet acid pre-scrubber and three (3) dry bed reactor units operating in parallel with an enforceable minimum control efficiency of 99% or 1 ppmv, whichever is less stringent. During pallet transfer when an aeration room door is open, an aeration bypass vent operates to draw air away from the operator and exhausts through voluntary controls consisting of three (3) dedicated dry bed reactors with a rated control efficiency of 99%.

IV. Various room exhaust vents continuously operate to maintain a negative pressure throughout the facility with emissions routed to voluntary control equipment

consisting of five (5) groups of three (3) dry bed reactors in parallel, each with a rated control efficiency of 99%.

2.3 Ethylene Oxide Abatement Technology

The wet acid scrubber system associated with sterilizer chamber vents function by hydrolyzing ethylene oxide. The scrubbing medium is a sulfuric acid solution in which the acid is used as a catalyst where the resulting product is ethylene glycol.

The wet pre-scrubber associated with the aeration vent emission control system removes ethylene oxide with an efficiency of ~85%, with its principal function being to reduce the mass loading of ethylene oxide to the chemisorption medium within the dry bed units. This effectively increases dry-bed media life and, accordingly, reduces bed replacement costs.

Dry bed reactors (chemisorbers) remove ethylene oxide from gas streams via a gas phase chemical reaction with a granular solid. The solid medium is a proprietary copolymer of styrene and divinylbenzene in the form of small beads. Ethylene oxide gas molecules contact the porous solid and react with active sites distributed throughout the solid matrix. The reaction product is an extended solid with ethylene oxide that is chemically bound to the solid medium.

3.0 REGULATORY COMPLIANCE

Ellettsville North currently operates in accordance with FESOP Renewal, F105-40744-00030, issued by the State of Indiana on August 30, 2019.

Historically, in accordance with site-specific FESOP requirements and NESHAP, Cook successfully completed performance tests for regulated control systems in 1999, 2003, 2013, and 2018. Results of all compliance tests to date demonstrated compliance to applicable performance standards.

3.1 Compliance Requirements

Performance testing is typically required at least once every five (5) years relative to the most recent valid performance test where the facility must demonstrate compliance with Condition. D.1.5 of their FESOP. The most recent performance test was completed in 2018, however, Compliance Determination Requirements within the FESOP Renewal

require the completion of a performance test no later than 180 days after issuance of the permit.

Accordingly, a performance test must be completed for each of the following control devices to demonstrate compliance with Condition D.1.1, Condition D.1.2, Condition D.1.5. and Condition E.1.2 of their permit:

I. The one (1) primary wet acid scrubber, exhausting to stack PS01, controlling ethylene oxide emissions from the two (2) sterilization chambers S8 through S9[1];

II. The single non-regenerable dry bed reactor, exhausting to stack SV01, controlling back vent emissions from the seven (7) sterilization chambers S1 through S7;

III. The one (1) wet acid pre-scrubber and three (3) dry bed reactors (in parallel), exhausting to stack HV01, controlling ethylene oxide emissions from the fourteen (14) aeration rooms;

The performance test is intended to confirm efficiency of the control devices and site-specific operating parameters for the above listed equipment. As detailed in Condition D.1.1 of the FESOP Renewal, regulated control equipment relevant to Compliance Determination must adhere to the following limitations:

I. A maximum concentration of 1 ppmv or at least 99% control efficiency, whichever is less stringent, for the single dry bed reactor controlling Sterilizer S1 through S7 back vents;

II. A maximum concentration of 1 ppmv or at least 99% control efficiency, whichever is less stringent, for the wet acid pre-scrubber with three (3) dry bed reactors (in parallel) controlling emissions from fourteen (14) aeration rooms[2]; and,

III. A minimum control efficiency of 99% for the primary wet acid scrubber controlling ethylene oxide emissions from sterilization chamber (vacuum) vents for Sterilizer S1 through S9.

[1] Although the FESOP Renewal indicates that only Sterilizers S8 and S9 are applicable to the wet scrubber, in our opinion, IDEM's intention was to incorporate Chamber S1 through S9.
[2] The FESOP Renewal only regulates emissions associated with the pre-scrubber and three dry bed units utilized during aeration (Header A & Header B). The Aeration Bypass operated during room loading is voluntarily controlled

It should be noted that voluntarily equipment installed at Ellettsville North is not required to undergo Compliance Determination. However, Cook plans to complete performance testing for voluntary equipment once the recently submitted Administrative Amendment is approved by IDEM.

4.0 COMPLIANCE & TEST METHODOLOGY

Several independent emission control systems are used to treat ethylene oxide emissions from multiple sources and operating sequences. Accordingly, the test program has been designed as follows to isolate and characterize emissions in accordance with each applicable standard.

4.1 Primary Wet Acid Scrubber

Compliance for the primary wet acid scrubber is determined via operation of the sterilization chamber vent (vacuum pump). The operating permit restricts operations at the facility to a maximum of four (4) sterilizers that can be simultaneously discharged to the primary wet scrubber. To demonstrate a worst-case scenario, the two largest sterilizers, Sterilizer S8 and S9, along with any two additional sterilizers will be simultaneously evacuated to the wet scrubber. Sterilizer chambers will be charged to normal concentrations of ethylene oxide while remaining void of any pallets or product.

Efficiency of the primary wet acid scrubber is then determined in accordance with 40 CFR 63.365 (b) and (c) (2). After completion of the simultaneous discharge, two additional tests will be performed using Sterilizer S8 then Sterilizer S9. An average of the three primary wet acid scrubber performance tests will serve as a basis for compliance.

4.2 Wet Acid Pre-Scrubber and Dry Bed Reactors for Aeration

Two header vents are utilized during the aeration process, designated as Header A and Header B, and operate independent of the aeration bypass exhaust vent. Header A routes emissions through a wet acid pre-scrubber prior to entering dry bed reactors. Header B routes emissions directly to the above-mentioned dry bed reactors.

Both headers are subject to identical requirements for 99% minimum efficiency or 1 ppmv detection at the dry bed outlet, whichever is less stringent, and there is no requirement to test the wet acid pre-scrubber. IDEM has historically approved testing of Header B alone to represent compliance for aeration control equipment. This test method

represents a worst-case scenario because Header B does not utilize the pre-scrubber system.

Performance testing of aeration control equipment is configured to ensure compliance with 326 IAC 8-1-6 (BACT) and 40 CFR Subpart O as well as to confirm the FESOP (326 IAC 2-8) status of the source.

4.3 Dry Bed Reactor – Sterilizer S1-S7 Back Vents

The existing sterilization back vents for Sterilizers S1 through S7 are controlled by a single dry bed reactor with existing monitoring and record keeping requirements established within each FESOP. However, the FESOP Renewal requires a Compliance Determination for the single dry bed reactor controlling back vent emissions for these chambers.

40 CFR Part 63, Subpart O, does not provide test methods or procedures for chamber exhaust vents/dry beds. Accordingly, relevant methods from within the California Environmental Protection Agency Air Resources Board (CARB) Method 431 are utilized for the basis of back vent testing.

CARB Method 431, Appendix A, specifies that efficiency calculations can be based solely on ethylene oxide concentration measurements without volumetric flow measurement as long as the following criteria are met:

I. There is no dilution between the inlet and outlet sampling locations

II. There is identical flow at the inlet and outlet sampling locations, and

III. There is constant flow throughout the duration of the compliance test.

5.0 PERFORMANCE TESTTING

Performance testing for emissions control systems incorporates procedures listed within 40 CFR 63.363 (Compliance and Performance Testing), 40 CFR 63.365 (Test Methods and Procedures), and 40 CFR 63.7 of Subpart A, CARB Method 431 as well as provisions of 326 IAC 3-6 (Source Sampling Procedures).

5.1 Compliance Test 1: Sterilization Chamber Vent

The initial performance test to demonstrate compliance of the primary wet scrubber will operate following the maximum operational capacity allowed under the FESOP Renewal utilizing simultaneous discharges of four (4) sterilizers.

The two (2) largest chambers by volume, Sterilizers S8 and S9, in addition to any two of the remaining seven chambers will be incorporated within the test. Chambers will not contain any pallets and will operate under normal conditions including ethylene oxide charge density. After charging each chamber and a brief stabilization period to simulate the normal sterilization (exposure) cycle, the sterilization chamber vents will be initiated by simultaneously evacuating all sterilizers.

Due to health and safety considerations associated with ethylene oxide concentrations at the wet scrubber inlet, ethylene oxide mass will be determined by application of the Ideal Gas Law, utilizing measured sterilizer process conditions, i.e., pressure, temperature, and sterilizer free volume in addition to a known sterilizer charge density. Refer to Section 6.0 for calculation methods.

Concentration of ethylene oxide from the wet scrubber outlet will be determined via gas chromatography on one-minute intervals throughout the approximate eighteen (18) minute chamber evacuation. Flow measurements and relative humidity will continuously be recorded within the wet scrubber exhaust duct adjacent to the ethylene oxide sample port. The following data will also be recorded as part of Compliance Test 1:

I. Initiation and termination time for each sequence;

II. Sterilizer pressure, initial and at beginning/end of each evacuation (each sterilizer);

III. Sterilizer temperature (each sterilizer), at initial charge and at the beginning and end of initial SCV evacuation;

IV. Scrubber liquid level; and,

V. Ethylene Oxide (EO) gas charge for each sterilizer

Flow rates will be measured in accordance with USEPA Reference Method 2C using a standard pitot tube and an inclined-oil manometer. Exhaust gas composition will be assumed to be air and small amounts of water vapor. Water vapor will be negligible, about 3 percent for the inlet and the outlet. Temperature measurements will be obtained from a thermocouple attached to the sampling probe.

Two subsequent test runs will be completed following the above procedures where each test includes the evacuation of a single sterilizer chamber. It is anticipated that Sterilizer S8 and S9 will be used individually as part of the second and third test runs.

5.2 Compliance Test 2: Aeration Room Vent (Header B)

Compliance of the aeration control systems will be determined through a series of aeration tests using sterilized pallets within the hot cells. After loading freshly sterilized product within at least three aeration rooms, exhaust vents will be routed through Header B (directly to the three Hot Cell Dry Bed Reactors). Remaining aeration rooms may be utilized by sterilized pallets as part of ongoing normal operations at the facility to simulate a worst-case scenario for the aeration cycle during testing.

Sample ports will be connected to one inlet and one outlet location relative to the dry bed units for use in volumetric flow rates, relative humidity and analyses of ethylene oxide concentration via gas chromatography. Flow rates will be measured in accordance with USEPA Reference Method 2C using a standard pitot tube and an inclined-oil manometer.

Samples will be collected on five (5) minute intervals over the course of three hours. The three-hour testing period will constitute the aeration test utilizing only Header B in accordance with 40 CFR 63.365 (d) (1), (2) and (3). Test results will be reported as the arithmetic average control efficiency from the estimated forty (40) injections collected.

Exhaust gas composition will be assumed to be air and small amounts of water vapor. Water vapor will be negligible, about 3 percent for the inlet and the outlet. Temperature measurements will be obtained from a thermocouple attached to the sampling probe. Refer to Section 6.0 for inlet and outlet mass calculations.

5.3 Compliance Test 3: Back Vent Cycle (S1-S7)

Concentration of ethylene oxide observed from the back-vent cycle is significantly lower than during the sterilization chamber vent evacuations. Accordingly, samples can be collected via gas chromatography directly from the dry bed inlet concurrent with sampling of the dry bed outlet. Samples will be collected on 1-minute intervals throughout the approximate 15-minute back vent period.

As detailed in Section 4.3 of this report, CARB Method 431 dictates that the change in concentration of ethylene oxide is sufficient to provide an efficiency calculation for the dry bed units.

It is proposed that three test runs be completed to demonstrate compliance, two utilizing back vents from [redacted] cubic foot sterilizers and one [redacted] cubic foot sterilizer. This will result in a total of three test runs for Compliance Test 3. An average of the three dry bed performance tests will be utilized for compliance determination.

6.0 CONTROL-EFFICIENCY & MASS-EMISSIONS CALCULATIONS

6.1 Compliance Test 1 (Inlet)

Calculation of Mass by Ideal Gas Law

Mass of ethylene oxide will be determined in accordance with 40 CFR 63.363, (b) (1) (i) (c), the sterilization chamber prior to Sterilizer Chamber Venting by using the following equation:

EQUATION 1

$$W_C = \frac{(MW)(m)(P)(V)}{(R)(T)}$$

Where:

Wc	=	*Mass of Ethylene Oxide charged, lbm*
MW	=	*Molecular weight of Ethylene Oxide (44.05 lb/mol)*
M	=	*Mole fraction of EO @ 44.05 / $W_{\%EO}$ = 99.97%*
P	=	*Chamber pressure, psia*
V	=	*Chamber volume, ft^3*
R	=	*Gas constant, 10.73 psia x ft^3 / mole x ^oR*
T	=	*Temperature, ^oR*

Residual Charge of Ethylene Oxide (Mass)

The residual mass of ethylene oxide in the sterilizer (Wr) is determined using the Ideal Gas Law. Relevant data collected during the performance test including chamber temperature, pressure, and volume are used as follows:

EQUATION 2

$$W_r = \frac{(MW)(m)(P)(V)}{(R)(T)}$$

Inlet Mass to Control System

The total mass of ethylene oxide to the inlet to the control device (Wi) will be calculated by subtracting the residual mass (Wr) calculated with Equation 2 from the charged weight (Wc) calculated by Equation 1.

EQUATION 3

$$W_i = W_c - W_r$$

6.2 Mass Flow Calculation Method

All Compliance Test Outlets and Compliance Test 2 & 3 Inlets

Mass of ethylene oxide within the exhaust duct, whether measured at the inlet of a dry bed (W_i) or from a control device outlet (W_O) shall be calculated using the detected concentration of ethylene oxide and flow rate at relevant sample locations:

EQUATION 4

$$W_o = \frac{\left(VolFlow\ \frac{ft^3}{min}\right)\left(T_c\ \frac{min}{cycle}\right)\left(Mol.Wt.\frac{lbs}{mol}\right)\left(ppmv\ \frac{ppm\ EO}{10^6}\right)}{(Mol.Vol.)}$$

Where:

VolFlow	=	*Corrected volumetric flow rate (DCFM), standard cubic feet per minute at 68^0F and 1 atm pressure (29.92" Hg)*
T_c	=	*Total Cycle Time, minutes*
MolWt	=	*44.05 pounds of EO per pound mole*
Ppmv	=	*Ppm EO concentration converted parts per million by volume via 10^6 conversion factor, ppmv per "cubic foot per cubic foot"*
MolVol	=	*385.32 cubic feet per pound mole at standard conditions of one atmosphere and 68^0F*

Equation 4 will be used to calculate the inlet and outlet mass numbers for both the Primary and Secondary Aeration Room Vent Control efficiency calculations.

6.3 Control Device Efficiency

The efficiency of each control device will be calculated with the following equation:

EQUATION 5

$$C_E = \frac{(W_i - W_o)}{(W_i \, x \, 100)}$$

Where:

C = *Percent efficiency*
W_I = *Mass flow rate into control device*
W_O = *Mass flow rate out of the control device*

The calculated test performance results using the above equations will be presented in the final test report.

7.0 QUALITY ASSURANCE / QUALITY CONTROL

7.1 On-Site Gas Chromatograph

EO samples will be analyzed by an SRI, Model 8610C, portable gas chromatograph (GC), with the following applications: programmable column oven temperature from ambient to 400°C, mount up to six detectors and five injectors, control of up to 16 heated zones, three gas sampling valves, and seven EPC gas pressures. Up to six (6) detectors, from a choice of sixteen (16), can be mounted simultaneously. The airbath oven can hold a standard 7-inch diameter megabore column cage, or multiple columns with smaller coil sizes. A flame ionization detector (FID) will be used to quantify high-level EO emissions, and a photoionization detector (PID) will be used to quantify low-level EO emissions at the emission-control device outlet.

Source gas samples will be injected into a Gas Chromatograph (GC) equipped with a sampling loop containing a volume of approximately 2cc and maintained at 100°C. (See Section 7 for calibration details.)

7.2 Calibration Procedures

The calibration of all applicable manual sampling equipment will generally follow the QA / QC procedures in 40 CFR 60, the EPA "Quality Assurance Handbook," Volume III, APTA0576, and all applicable equipment manufacturers procedures. If sampling procedures differ from standard EPA methods, these variations will be noted.

The GC system will be calibrated at the beginning and conclusion of each day's testing. Each of the calibration standards will be taken from a separate, certified manufacturer's cylinder.

All calibration gases and support gases will be of the highest purity and quality available. A copy of the laboratory certification for each calibration gas will be included in the final report. Calibration curves will be generated using a least square linear regression.

The FID will be calibrated for mid-range part-per-million-by-volume (ppmv) level analyses using gas proportions similar to the following:

I. 1,000 ppmv EtO, balance nitrogen
II. 100 ppmv EtO, balance nitrogen
III. 50 ppmv EtO, balance nitrogen (audit gas)
IV. 10 ppmv EtO, balance nitrogen

The PID will be calibrated for low-range ppmv level analyses using gas proportions similar to the following:

I. 100 ppmv EtO, balance nitrogen
II. 50 ppmv EtO, balance nitrogen (audit gas)
III. 10 ppmv EtO, balance nitrogen
IV. 1 ppmv EtO, balance nitrogen

Each of these calibration standards will be in a separate, certified manufacturer's cylinder. Copies of the calibration gas laboratory certificates will be included with the final report. Please refer to *Method 18: Measurement of Gaseous Organic Compound Emissions By Gas Chromatography* attached as Appendix B for further calibration details.

8.0 TEST REPORT

Test results will be provided to IDEM within a Compliance Test Report no later than forty-five (45) days after completion of the on-site testing. The report will provide a basis for Compliance Determination following Condition D.1.1 and Condition D.1.5 of the FESOP Renewal through completion of a tiered review process. Relevant copies of gas chromatograms, sterilization cycle data reports, field reports, flow measurement logs, site photography and sample locations will be provided as supporting documentation within the report.

APPENDIX D

PHOTOGRAPHS AND FIELD REPORT

FIELD REPORT

TO: Cook Sterilization Facility, Ellettsville, IN **DATE**: February 6-7, 2020

JOB NO: 5450.12

PROJECT NAME: FESOP 47044 Compliance Test - February 2020

PRESENT AT SITE:
Simon Thomas & Zachary Thomas of Atlantic Design Engineers
Daniel Kremer of ECSi, Inc.
Art Harris, Jared Prow, and Brad Stout of Cook Inc.

LOCATION: 6300 North Matthews Drive, Ellettsville, IN

CONTRACTOR(S): Atlantic Design Engineers, ECSi, Cook Inc.

OWNER: Cook Incorporated

TEST DAY 1 (FEBRUARY 6, 2020):

Atlantic Design Engineers, Inc. (Atlantic) and ECSi arrived on-site at 7:20 AM to begin calibration of the Gas Chromatograph following Method 18 using 1 ppm, 10 ppm and 100 ppm calibration gas. Calibration was completed by 8:30 AM. Dan Kremer or ECSi then began inspection of testing locations, sample points, flow meters, etc. prior to initiating the first test. See the attached pictures for SCV, ARV and Back Vent sampling points.

Scrubber tank levels were measured at 9:15 AM and were as follows:

- Common Tank – 74.0”
- Scrubber Tank – 102.0”
- Aeration Tank – 102.0”

<u>ARV Test #1-#3 (2-6-2020)</u>

In preparation for ARV Test #1, pallet transfer was initiated at approximately 9:00AM utilizing product sterilized in Chambers 1, 2, 8 and 9. Pallets were transferred to hot cells 1, 2, 3 and 9 with the ARV cycle configured to exhaust directly to Header B. The first GC injection for ARV Test #1 was completed at 9:15am. ARV Test #2 was initiated at 10:15am and ARV Test #3 was initiated at 11:15am.

The following conditions were noted every 60 seconds throughout each 55-minute testing period:

a. ΔP (inHg)
b. √ΔP
c. Temperature (ºF)
d. Relative Humidity

The following was collected on five minutes intervals throughout each 55-minute testing period:

a. Inlet and Outlet EtO concentrations

After completion of the three consecutive aeration sampling events, reduction efficiency was calculated to be 99.90%. Please refer to the attached ARV sampling summary and emissions calculation sheet.

SCV Test #1 (2-6-2020)

SCV Test#1 simulates a worst-case scenario via evacuation of four sterilization chambers simultaneously to the wet scrubber. The four-sterilizers chosen for the test included Sterilizer 1 ([redacted] Cubic Feet), Sterilizer 3 ([redacted] cubic feet), Sterilizer 8 ([redacted] cubic feet) and Sterilizer 9 ([redacted] cubic feet). The SCV Test began at 2:02PM and sampling was completed during the 18-minute Sterilant Removal Phase with injections each minute. The following was noted during the sampling period:

a. Ambient Moisture (percent)
b. Header Stack flowrate (ft/s)
c. Pressure (inHg)
d. Stack Volume (m^3)
e. Ambient Temperature (Rankine)
f. Outlet Concentration of Eto
g. Scrubber Liquid Level (Pre and Post test)
h. Initial EO charge by sterilizer

Outlet concentrations ranged from non-detect (0.025ppm) to 96.8ppm. See the attached SCV Run #1 results summary. Removal efficiency was calculated to be 99.98%.

Back Vent Test #1-3 (2-6-2020)

Sterilizers S1, S3 and S7 were charged with ethylene oxide with the chambers void of pallets (empty chambers). Once each chamber reached end of cycle, the back vents were initiated via opening of the chamber doors. Chambers were tested on an individual basis starting with Chamber S1 at 4:07PM, Chamber S3 at 4:25PM and Chamber S7 at 4:46PM.

See the attached back vent results summary. Average removal efficiency was calculated to be 99.95%.

Due to timing required to charge Chamber S8 and S9, SCV Test #2 and SCV Test #3 were reschedule for the following day (Friday 2-7-2020). Scrubber tank levels were measured at 5:10PM on 2/6/2020 and were as follows:

- Common Tank – 74.0”
- Scrubber Tank – 102.0”
- Aeration Tank – 102.0”

TEST DAY 2 (FEBRUARY 7, 2020):

Scrubber tank levels were again measured before testing began and were as follows:

- Common Tank – 74.0”
- Scrubber Tank – 102.0”
- Aeration Tank – 102.0”

SCV Test #2 (2-7-2020)

SCV Test #2 included the sterilant removal phase from Sterilizer 8 only ([redacted]). The SCV Test began at 3:05pm and sampling continued every minute throughout the 18-minute Sterilant Removal Phase. The same criteria were noted as during SCV Test #1.

Outlet concentrations did not exceed detection limits of the GC. See the attached SCV Run #2 results summary. Removal efficiency was calculated to be 99.99%.

SCV Test #3 (2-7-2020)

SCV Test #3 included the sterilant removal phase from Sterilizer 9 only ([redacted]). The SCV Test began at 3:25pm and sampling continued every minute throughout the 18-minute Sterilant Removal Phase. The same criteria were noted as during SCV Test #3.

Outlet concentrations did not exceed detection limits of the GC. See the attached SCV Run #3 results summary. Removal efficiency was calculated to be 99.99%.

Scrubber tank levels were again measured at 4:00 PM and were as follows:

- Common Tank – 74.0”
- Scrubber Tank – 102.0”
- Aeration Tank – 102.0”

Compliance Test Summary (February 6-7, 2020):

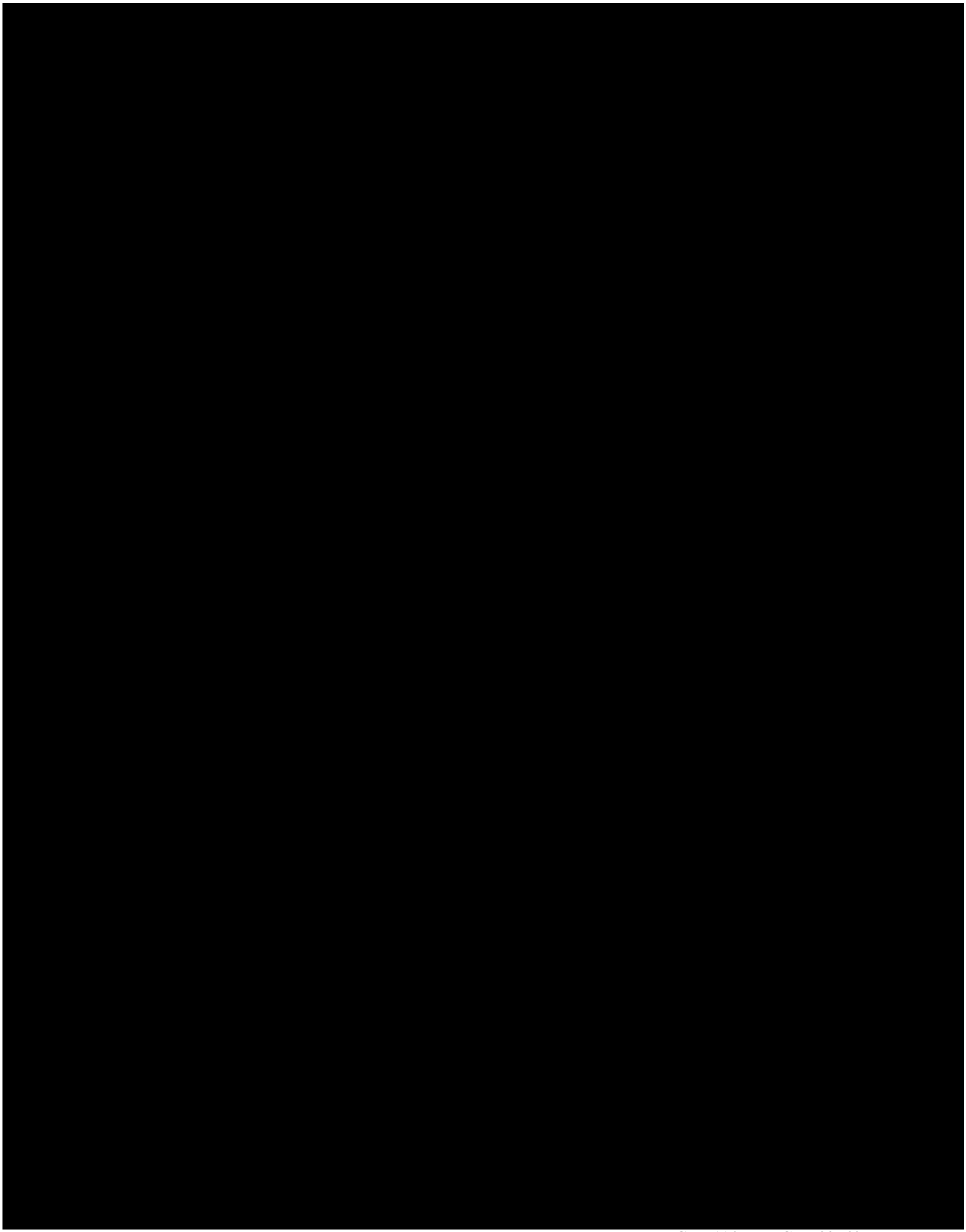
Description	Date	Time
1. GC Calibration & Sample Line Inspections	2/6/2020	7:30am–8:30am
2. ARV Test Run # 1 (Header B):	2/6/2020	9:15am–10:10am
3. ARV Test Run # 2 (Header B):	2/6/2020	10:15am–11:10am
4. ARV Test Run # 3 (Header A & B):	2/6/2020	11:15am–12:10pm
5. Sterilizer Chamber Vent Test # 1 (Simultaneous discharge from S-1, S-3, S-8 & S-9)	2/6/2020	2:04pm–2:22pm
6. Back Vent Test #1 (Chamber S1):	2/6/2020	4:07pm–4:22pm
7. Back Vent Test #2 (Chamber S3):	2/6/2020	4:25pm–4:40pm
8. Back Vent Test #3 (Chamber S7):	2/6/2020	4:46pm–5:01pm
9. Sterilizer Chamber Vent Test #2 (Chamber S8):	2/7/2020	3:05pm–3:21pm
10. Sterilizer Chamber Vent Test #3 (Chamber S9):	2/7/2020	3:24pm–3:40pm

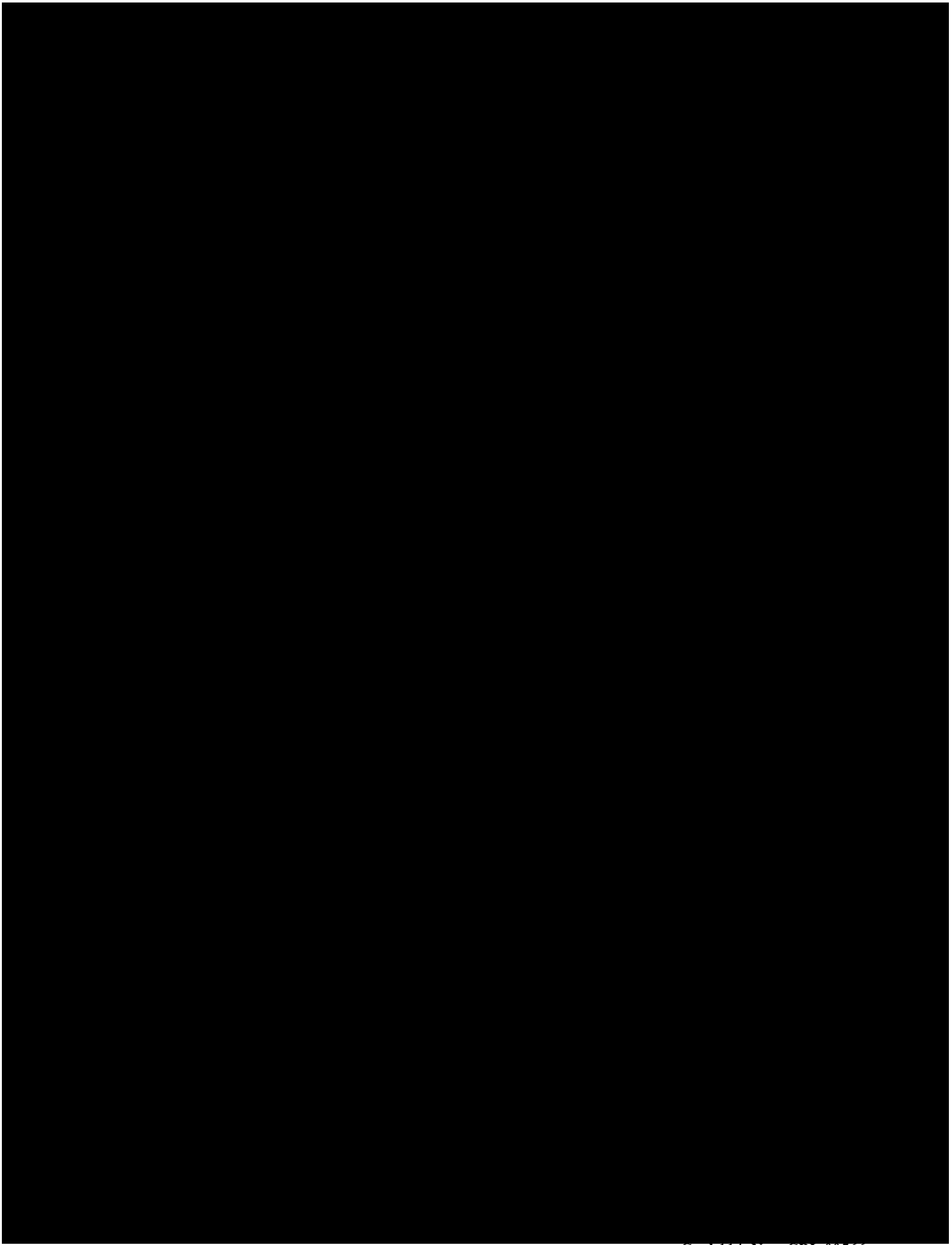
Efficiency Summary

SCV Average Efficiency: 99.99%

Back Vent Average Efficiency: 99.94%

ARV Efficiency: 99.90%





(9:15 - 10:10) am

Compliance Test Active Monitoring
Cook Facility

Run #/Desc.	ARV #1

Sample Number	Time	ΔP	Temperature
1	9:17	0.25	91
2	9:18	0.25	91
3	9:19	0.25	91
4	9:20	0.25	91
5	9:21	0.25	91
6	9:22	0.25	91
7	9:23	0.25	91
8	9:24	0.25	91
9	9:25	0.25	91
10	9:26	0.25	91
11	9:27	0.25	91
12	9:28	0.25	91
13	9:29	0.25	91
14	9:30	0.25	91
15	9:31	0.25	91
16	9:32	0.25	91
17	9:33	0.25	91
18	9:34	0.25	91
19	9:35	0.25	91
20	9:36	0.25	91
21	9:37	0.25	91
22	9:38	0.25	91
23	9:39	0.25	91
24	9:40	0.25	91
25	9:41	0.25	91
26	9:42	0.25	91
27	9:43	0.25	91
28	9:44	0.25	91
29	9:45	0.25	91
30	9:46	0.25	91
31	9:47	0.25	91
32	9:48	0.25	91
33	9:49	0.25	91
34	9:50	0.25	91
35	9:51	0.25	91
36	9:52	0.25	91
37	9:53	0.25	91

38	9:54	0.25	91
39	9:55	0.25	91
40	9:56	0.25	91
41	9:57	0.25	91
42	9:58	0.25	91
43	9:59	0.25	91
44	10:00	0.25	91
45	10:01	0.25	91
46	10:02	0.25	90
47	10:03	0.25	90
48	10:04	0.25	90
49	10:05	0.25	90
50	10:06	0.25	90
51	10:07	0.25	90
52	10:08	0.25	90
53	10:09	0.25	90
54	10:10	0.25	90
55	10:11	0.25	90
56	10:12	0.25	90
57			
58			
59			
60			

(9:15 - 10:10)

Compliance Test Active Monitoring
Cook Facility

Run #/Desc.	a20 #1

Sample Number	Time	% RH Bulb 1	% RH Bulb 2
1	9:18	42.2	42.7
2	9:19	42.5	42.7
3	9:20	42.3	42.5
4	9:21	42.1	42.7
5	9:22	41.5	42.4
6	9:23	41.3	41.9
7	9:24	41.7	42.2
8	9:25	41.7	43.1
9	9:26	42	42.1
10	9:27	42.4	42.5
11	9:28	41.6	42.6
12	9:29	42.3	42.6
13	9:30	41.8	42.3
14	9:31	41.8	41.9
15	9:32	41.8	42.4
16	9:33	41.4	41.5
17	9:34	41.8	42.3
18	9:35	41.5	42.5
19	9:36	41.4	42.5
20	9:37	42.3	42.6
21	9:38	41.9	42.3
22	9:39	41.6	42.1
23	9:40	41.5	41.9
24	9:41	41.2	41.9
25	9:42	41.9	42.3
26	9:43	41.4	42.4
27	9:44	41.6	41.8
28	9:45	41.3	42.1
29	9:46	41.3	42.1
30	9:47	41.5	42.4
31	9:48	41.1	41.6
32	9:49	41.5	42.2
33	9:50	41.7	42.1
34	9:51	41.4	41.6
35	9:52	41.2	41
36	9:53	41.3	42.1
37	9:64	41	42

38	9:55	41	41.5
39	9:56	41.4	42.1
40	9:57	41.4	42.6
41	9:58	41.7	41.4
42	9:59	41.8	41.9
43	10:00	41.1	40.9
44	10:01	41.1	41.5
45	10:02	41.4	41.4
46	10:03	41.5	42.2
47	10:04	41.4	41.9
48	10:05	41.4	41.9
49	10:06	40.4	40.7
50	10:07	40.1	40.3
51	10:08	39.8	39.9
52	10:09	39.5	39.7
53	10:10	39.5	39.9
54			
55			
56			
57			
58			
59			
60			

(10:15 - 11:10)

Compliance Test Active Monitoring Cook Facility	Run #/Desc.	ARV #2

Sample Number	Time	ΔP	Temperature
1	10:16	0.25	90
2	10:17	0.25	90
3	10:18	0.25	90
4	10:19	0.25	90
5	10:20	0.25	90
6	10:21	0.25	90
7	10:22	0.25	90
8	10:23	0.25	90
9	10:24	0.25	90
10	10:25	0.25	90
11	10:26	0.25	90
12	10:27	0.25	90
13	10:28	0.25	90
14	10:29	0.25	90
15	10:30	0.25	90
16	10:31	0.25	90
17	10:32	0.25	90
18	10:33	0.25	90
19	10:34	0.25	90
20	10:35	0.25	90
21	10:36	0.25	90
22	10:37	0.25	90
23	10:38	0.25	90
24	10:39	0.25	90
25	10:40	0.25	90
26	10:41	0.25	90
27	10:42	0.25	90
28	10:43	0.25	90
29	10:44	0.25	90
30	10:45	0.25	90
31	10:46	0.25	90
32	10:47	0.25	90
33	10:48	0.25	90
34	10:49	0.25	90
35	10:50	0.25	90
36	10:51	0.25	90
37	10:52	0.25	90
38	10:53	0.25	90

38	10:54	0.25	90
39	10:55	0.25	90
40	10:56	0.25	90
41	10:57	0.25	90
42	10:58	0.25	90
43	10:59	0.25	90
44	11:00	0.25	90
45	11:01	0.25	90
46	11:02	0.25	90
47	11:03	0.25	90
48	11:04	0.25	90
49	11:05	0.25	90
50	11:06	0.25	90
51	11:07	0.25	90
52	11:08	0.25	90
53	11:09	0.25	90
54	11:10	0.25	90
55	11:11	0.25	90
56	11:12	0.25	91
57			
58			
59			
60			

(10:15 - 11:10)

Compliance Test Active Monitoring Cook Facility	Run #/Desc.	AAV #2

Sample Number	Time	% RH Bulb 1	% RH Bulb 2
1	10:15	43.1	43.3
2	10:16	43.2	43.3
3	10:17	42.8	42.7
4	10:18	42.7	42.6
5	10:19	42.9	42.9
6	10:20	42.8	42.8
7	10:21	42.5	42.6
8	10:22	42.6	42.7
9	10:23	42.7	42.8
10	10:24	42.7	42.9
11	10:25	42.8	42.7
12	10:26	42.3	42.4
13	10:27	42.3	42.4
14	10:28	42.1	42.3
15	10:29	42.4	42.7
16	10:30	42.3	42.4
17	10:31	42.1	42.6
18	10:32	42.1	42.4
19	10:33	41.8	42.1
20	10:34	41.8	42.3
21	10:35	41.6	41.9
22	10:36	41.7	41.9
23	10:37	41.6	42.1
24	10:38	41.7	41.3
25	10:39	41.9	42.4
26	10:40	41.8	42.3
27	10:41	41.4	41.7
28	10:42	41.4	41.7
29	10:43	41.5	41.8
30	10:44	41.5	41.9
31	10:45	41.3	41.7
32	10:46	41.4	41.6
33	10:47	41.6	41.7
34	10:48	41.7	41.9
35	10:49	41.3	42.5
36	10:50	41.4	41.6
37	10:51	41.3	41.9
38	10:52	41.1	41.4

38	10:53	41.1	41.4
39	10:54	41.4	41.6
40	10:55	41.5	41.6
41	10:56	41.6	41.8
42	10:57	41.7	41.9
43	10:58	41.3	41.6
44	10:59	41.4	41.7
45	11:00	41.3	41.5
46	11:01	41.4	41.8
47	11:02	41.5	41.9
48	11:03	41.5	41.7
49	11:04	41.3	41.6
50	11:05	41.2	41.4
51	11:06	41.1	41.7
52	11:07	41.2	41.5
53	11:08	41.1	41.5
54	11:09	41.3	41.8
55	11:10	41.4	41.6
56	11:11	41.3	41.8
57	11:12	41.4	41.7
58			
59			
60			

(11:15 - 12:11

Compliance Test Active Monitoring Cook Facility	Run #/Desc.	ARV #3

Sample Number	Time	% RH Bulb 1	% RH Bulb 2
1	11:17	43.4	43.3
2	11:18	43.5	43.7
3	11:19	43.4	43.1
4	11:20	43.2	43.2
5	11:21	43	43.1
6	11:22	43.5	43.2
7	11:23	43.5	43.6
8	11:24	43.5	43.6
9	11:25	43.7	43.8
10	11:26	43.5	43.2
11	11:27	43.5	43.4
12	11:28	42.9	43
13	11:29	42.8	43.1
14	11:30	43.1	42.9
15	11:31	43.2	43.4
16	11:32	42.8	42.9
17	11:33	42.6	42.8
18	11:34	42.7	42.4
19	11:35	42.6	42.7
20	11:36	42.6	42.5
21	11:37	42.5	42.3
22	11:38	42.4	42.1
23	11:39	42.3	42.1
24	11:40	42.3	41.3
25	11:41	42.3	42.4
26	11:42	42.4	42.3
27	11:43	42.4	42.6
28	11:44	42.5	41.2
29	11:45	42.5	42.7
30	11:46	42.4	42.6
31	11:47	42.3	42.1
32	11:48	42.6	42.1
33	11:49	42.7	42.4
34	11:50	42.5	42.5
35	11:51	42.1	42.2
36	11:52	42.3	42.5
[redacted]	[redacted]		[redacted]
37	11:53	42.2	41.9

~~38~~			
~~39~~ 38	11:54	41.9	41.7
~~40~~ 39	11:55	41.8	41.9
~~41~~ 40	11:56	41.9	41.7
~~42~~ 41	11:57	41.9	41.8
~~43~~ 42	11:58	41.8	41.9
~~44~~ 43	11:59	41.7	41.9
~~45~~ 44	12:00	41.5	41.6
~~46~~ 45	12:01	41.6	41.7
~~47~~ 46	12:02	41.6	41.5
~~48~~ 47	12:03	41.5	41.8
~~49~~ ~~48~~	12:04	41.7	41.9
~~50~~ 49	12:05	41.6	41.7
~~51~~ 50	12:06	41.3	41.6
~~52~~ 51	12:07	41.4	41.4
~~53~~ 52	12:08	41.5	41.7
~~54~~ 53	12:09	41.3	41.5
~~55~~ 54	12:10	41.3	41.8
~~56~~ 55	12:11	41.7	41.6
~~57~~ 56	12:12	41.5	41.7
58			
59			
60			

(11:15 - 12:10)

Compliance Test Active Monitoring Cook Facility	Run #/Desc.	ARV #3

Sample Number	Time	ΔP	Temperature
1	11:18	0.25	91
2	11:19	0.25	91
3	11:20	0.25	91
4	11:21	0.25	91
5	11:22	0.25	91
6	11:23	0.25	91
7	11:24	0.25	91
8	11:25	0.25	91
9	11:26	0.25	91
10	11:27	0.25	91
11	11:28	0.25	91
12	11:29	0.25	91
13	11:30	0.25	91
14	11:31	0.25	91
15	11:32	0.25	90
16	11:33	0.25	90
17	11:34	0.25	90
18	11:35	0.25	90
19	11:36	0.25	90
20	11:37	0.25	90
21	11:38	0.25	90
22	11:39	0.25	90
23	11:40	0.25	90
24	11:41	0.25	90
25	11:42	0.25	90
26	11:43	0.25	90
27	11:44	0.25	90
28	11:45	0.25	90
29	11:46	0.25	90
30	11:47	0.25	90
31	11:48	0.25	90
32	11:49	0.25	90
33	11:50	0.25	90
34	11:51	0.25	90
35	11:52	0.25	90
36	11:53	0.25	90
37	11:54	0.25	90
38	11:55	0.25	90

38			
39	11:56	0.25	90
40	11:57	0.25	90
41	11:58	0.25	90
42	11:59	0.25	90
43	12:00	0.25	90
44	12:01	0.25	90
45	12:02	0.25	90
46	12:03	0.25	90
47	12:04	0.25	90
48	12:05	0.25	90
49	12:06	0.25	90
50	12:07	0.25	90
51	12:08	0.25	90
52	12:09	0.25	90
53	12:10	0.25	90
54	12:11	0.25	90
55	12:12	0.25	90
56			
57			
58			
59			
60			

APPENDIX E

CALBRATION PROCEDURES/DATA

SDAPCD-CARB EtO Calibration Worksheet

Site: Cook - Ellettsville, IN

Date: 2/6/2020

INLET - FID

ppm	0	1.18	10.2	100	1,000	10,080
Area 1	0	0.598	5.09	49.9		
Area 2	0	0.597	5.09	50.2		
Area 3	0	0.593	5.11	50.0		
AVG.	0	0.5960	5.097	50.03		

	AUDIT	POST CAL
	52.0	52.0
	READS	READS
	51.2	51.7
Dev.	-1.5%	-0.6%

OUTLET - PID

ppm	0	1.18	10.2	100
Area 1	0	1.70	14.4	141
Area 2	0	1.71	14.6	140
Area 3	0	1.69	14.4	142
AVG.	0	1.700	14.47	141.0

	AUDIT	POST CAL
	52.0	52.0
	READS	READS
	51.9	51.5
Dev.	-0.2%	-1.0%

LOD Calculation EtO

Cook - Ellettsville, IN

2/6/2020

Outlet

Lowest Cal Gas

	Y =	A	+	m	x
	ppm =	-2.84E-02	+	0.709396	x area

	Area	Calc ppm			
	1.70	1.178	ppm	LOD = A+3s	
	1.71	1.185	ppm	LOD = 0.050	ppm
	1.69	1.171	ppm		
AVG		**1.178**	ppm		
Std Dev		**0.007**	ppm		

1/2 LOD = 0.025 ppm

Inlet

Lowest Cal Gas

	Y =	A	+	m	x
	ppm =	0.00	+	2.00	x area

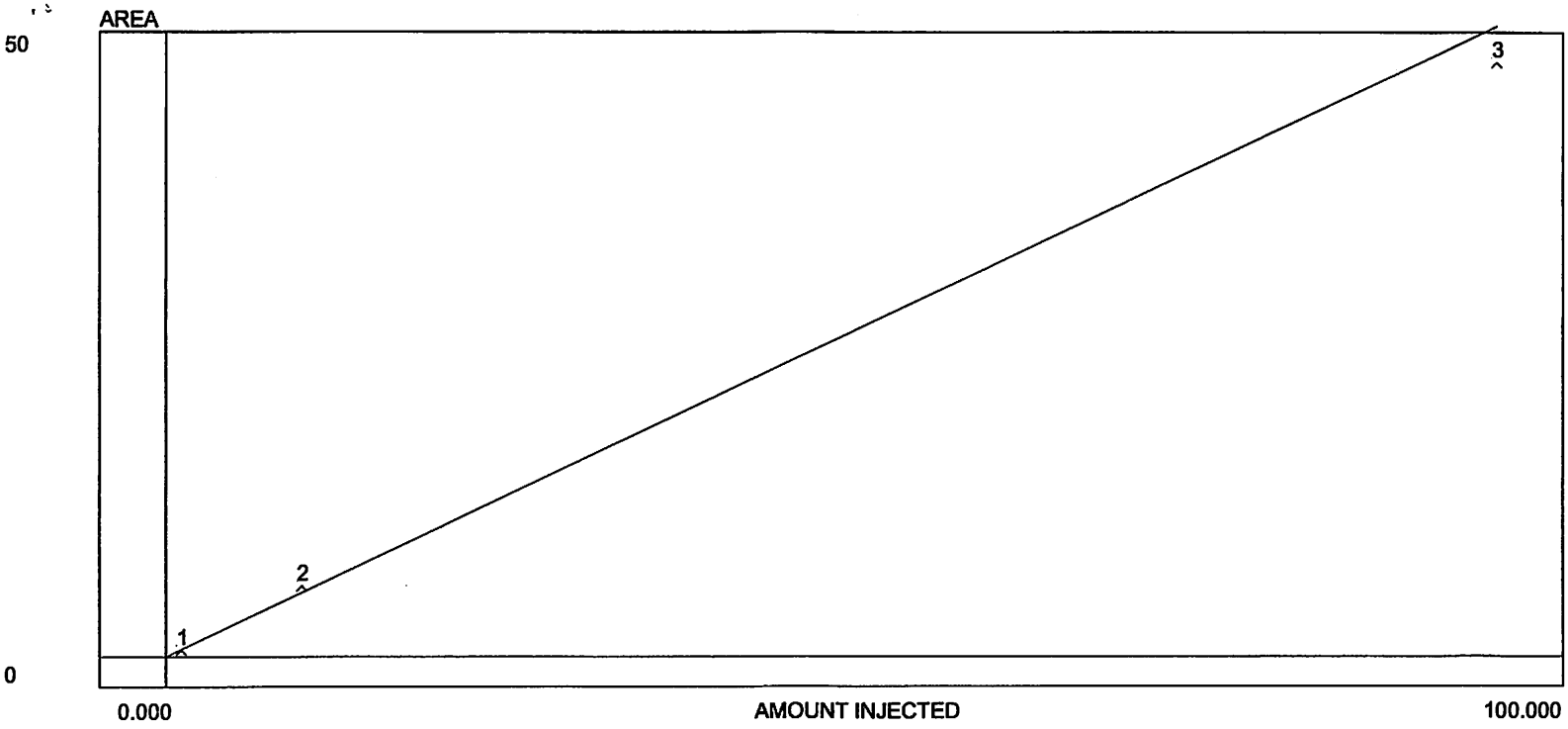
	Area	Calc ppm			
	0.598	1.196	ppm	LOD = A+3s	
	0.597	1.194	ppm	LOD = 0.016	ppm
	0.593	1.186	ppm		
AVG		**1.192**	ppm		
Std Dev		**0.005**	ppm		

1/2 LOD = 0.008 ppm

Component file: eto1-100.cpt

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.400		0.000	
3	Ethylene Oxide	0.400	0.550	C:\peak454-64bit\0.000\1Cppm2020.CAL		
4	Acetaldehyde	0.550	1.000		0.000	

Calibration file: C:\peak454-64bitWin10\1Cook2020.CAL



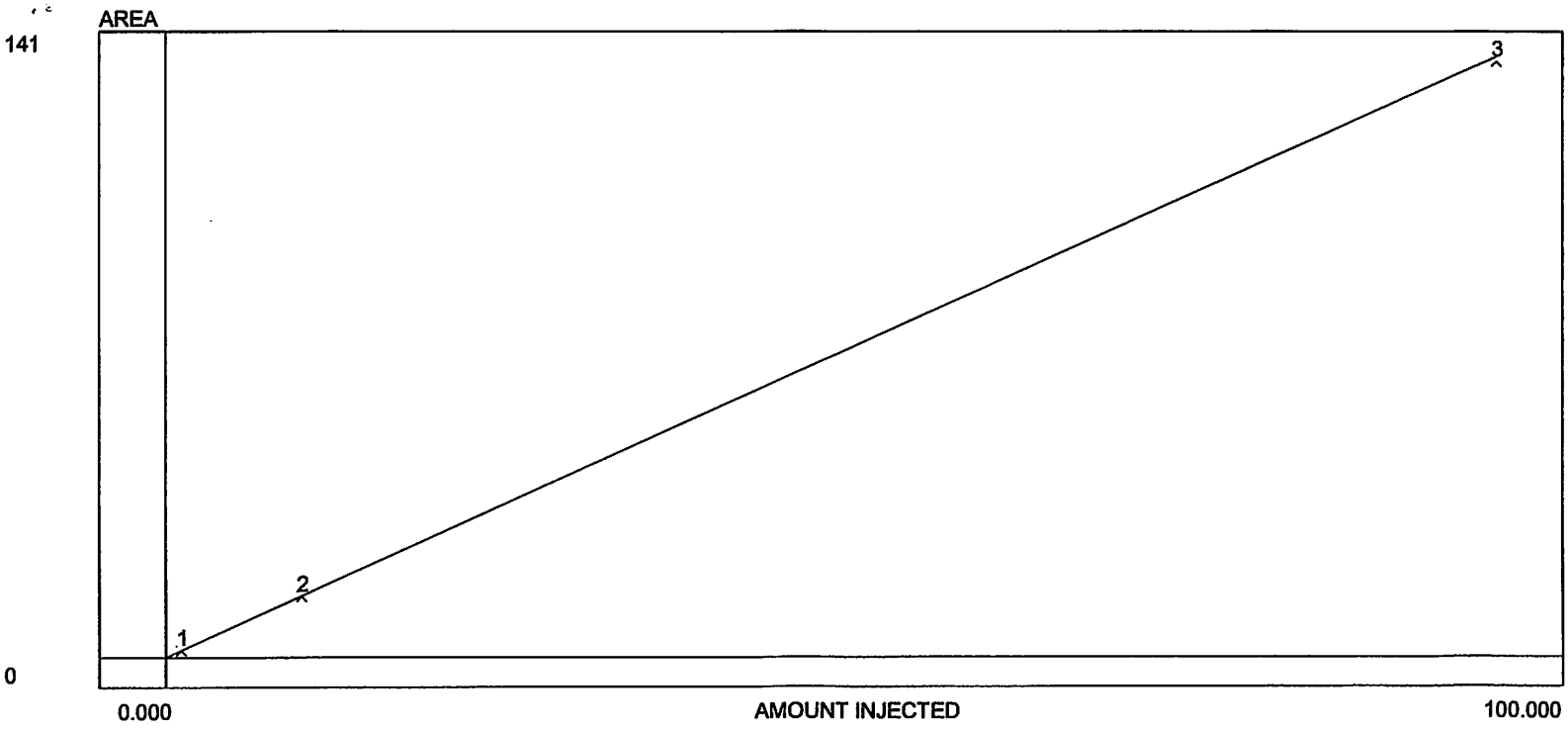
Avg slope of curve: 0.53
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 3
SD/rel SD of CF's: 0.0/9.0
Y=0.5302X
r2: 0.9997
Last calibrated: Thu Feb 06 08:40:32 2020

Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	0.596	1.180	0.505	0.596	N/A	N/A
2	5.970	10.200	0.585	5.970	N/A	N/A
3	50.030	100.000	0.500	50.030	N/A	N/A

Component file: eto2-100.cpt

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.400		0.000	
3	Ethylene Oxide	0.400	0.510	C:\peak454-64bit\0.000\2Cppm2020.CAL		
4	Acetaldehyde	0.510	1.000		0.000	

Calibration file: C:\peak454-64bitWin10\2Cook2020.CAL



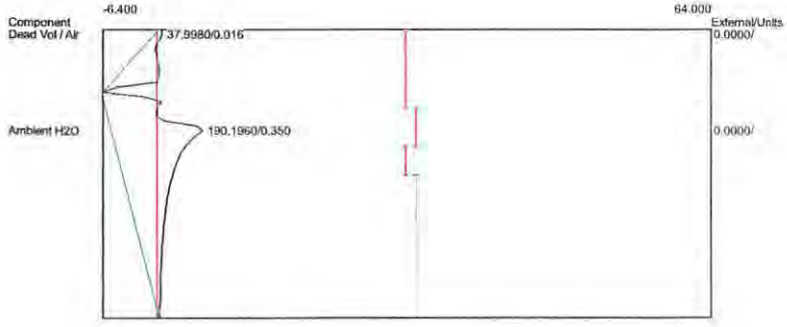
Avg slope of curve: 1.42
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 3
SD/rel SD of CF's: 0.0/1.2
Y=1.4211X
r2: 1.0000
Last calibrated: Thu Feb 06 08:38:17 2020

Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	1.700	1.180	1.441	1.700	N/A	N/A
2	14.410	10.200	1.413	14.410	N/A	N/A
3	141.000	100.000	1.410	141.000	N/A	N/A

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:30:38
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer

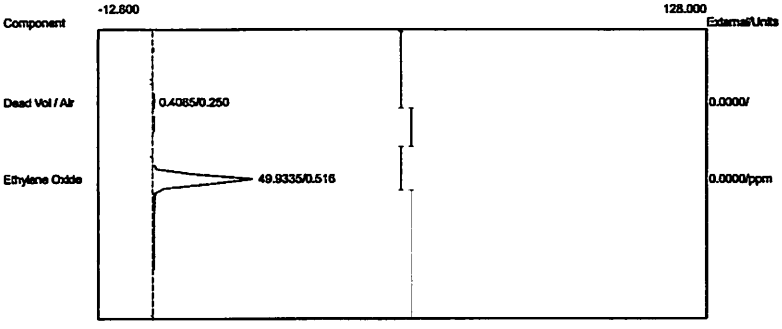
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.6710	0.0000	
Acetaldehyde	0.766	0.1050	0.0000	
		2.7760	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:30:38
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



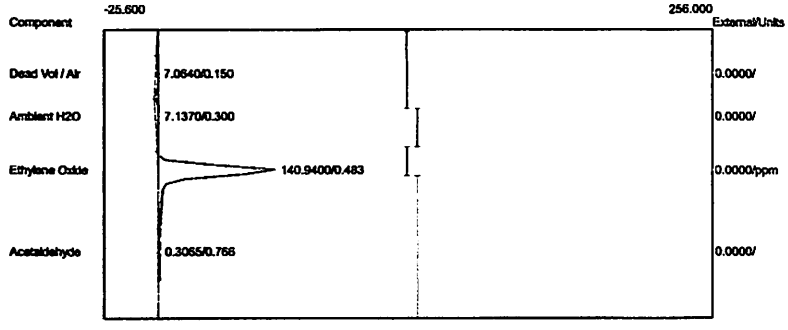
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	37.9980	0.0000	
Ambient H2O	0.350	190.1960	0.0000	
		228.1940	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:31:17
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C01.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



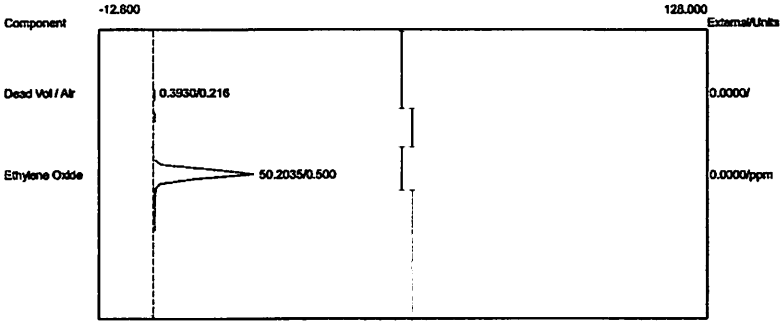
Component	Retention	Area	External	Units
Dead Vol / Air	0.250	0.4085	0.0000	
Ethylene Oxide	0.516	49.9335	0.0000	ppm
		50.3420	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:31:17
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C01.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



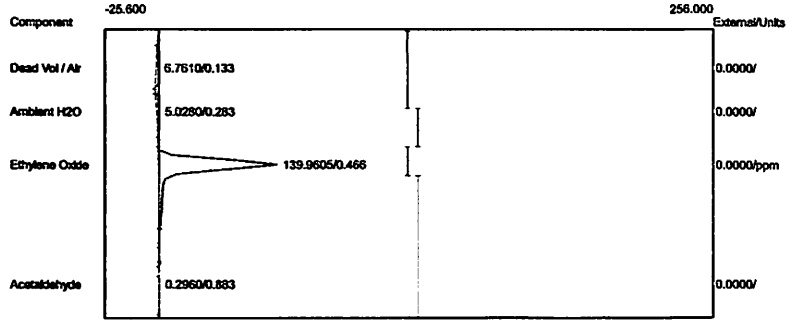
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	7.0640	0.0000	
Ambient H2O	0.300	7.1370	0.0000	
Ethylene Oxide	0.483	140.9400	0.0000	ppm
Acetaldehyde	0.766	0.3065	0.0000	
		155.4475	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:33:17
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C02.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



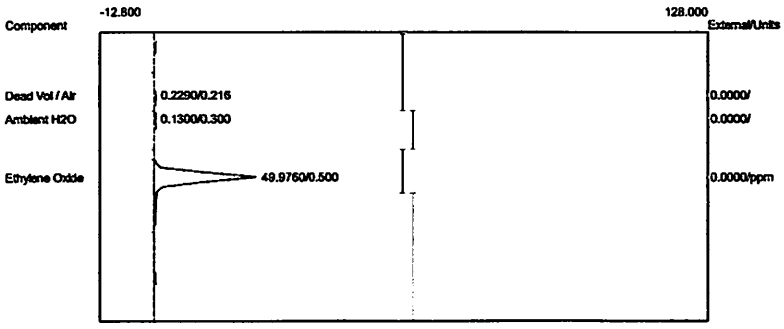
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.3930	0.0000	
Ethylene Oxide	0.500	50.2035	0.0000	ppm
		50.5965	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:33:17
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C02.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



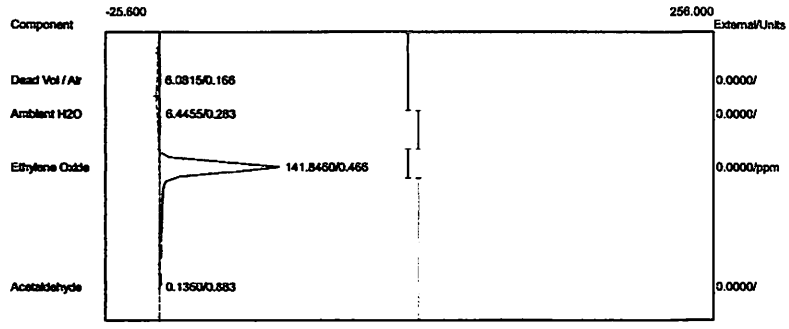
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	6.7610	0.0000	
Ambient H2O	0.283	5.0280	0.0000	
Ethylene Oxide	0.466	139.9605	0.0000	ppm
Acetaldehyde	0.883	0.2960	0.0000	
		152.0455	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:35:38
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C03.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



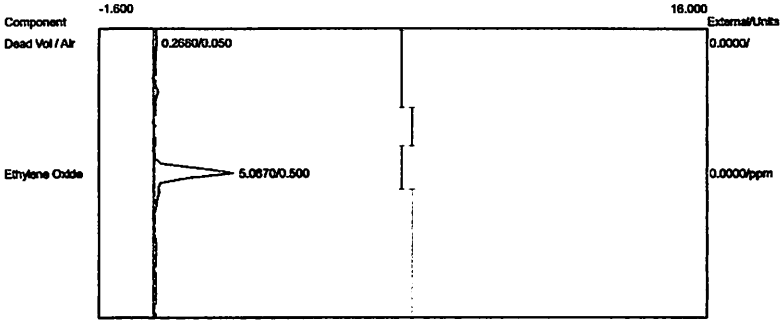
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.2290	0.0000	
Ambient H2O	0.300	0.1300	0.0000	
Ethylene Oxide	0.500	49.9760	0.0000	ppm
		50.3350	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:35:38
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C03.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



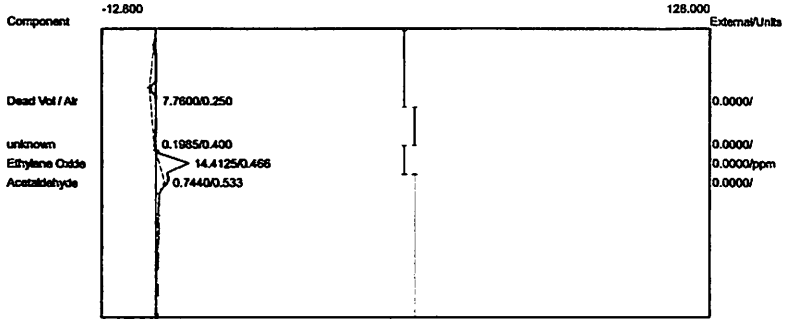
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	6.0815	0.0000	
Ambient H2O	0.283	6.4455	0.0000	
Ethylene Oxide	0.466	141.8460	0.0000	ppm
Acetaldehyde	0.883	0.1360	0.0000	
		154.5090	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:44:53
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C04.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



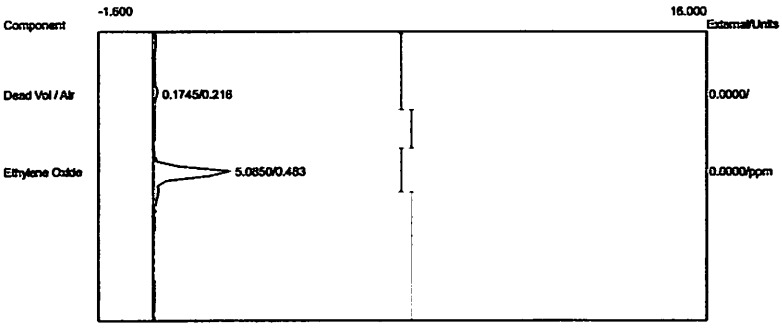
Component	Retention	Area	External	Units
Dead Vol / Air	0.050	0.2680	0.0000	
Ethylene Oxide	0.500	5.0870	0.0000	ppm
		5.3550	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:44:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C04.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



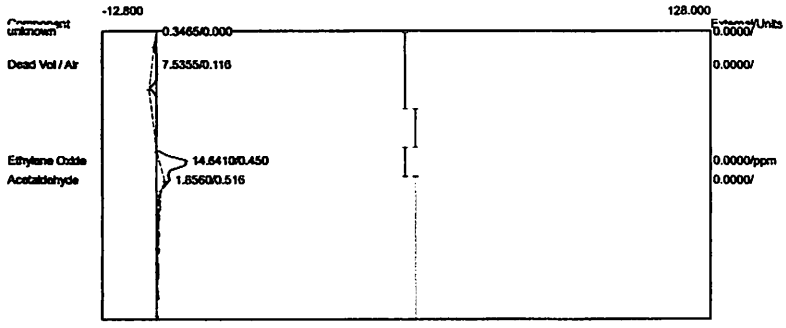
Component	Retention	Area	External	Units
Dead Vol / Air	0.250	7.7600	0.0000	
Ethylene Oxide	0.466	14.4125	0.0000	ppm
Acetaldehyde	0.533	0.7440	0.0000	
		22.9165	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:48:27
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C05.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



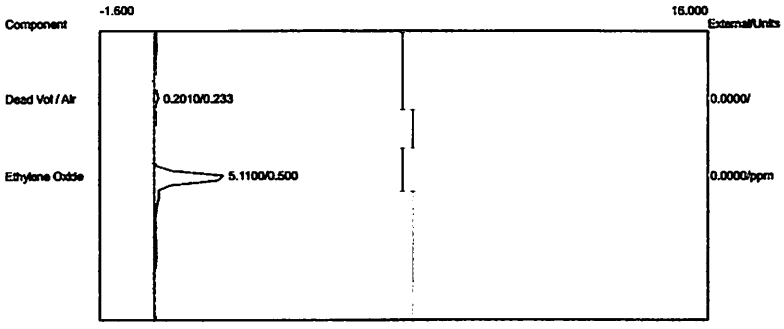
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.1745	0.0000	
Ethylene Oxide	0.483	5.0850	0.0000	ppm
		5.2595	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:48:27
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C05.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



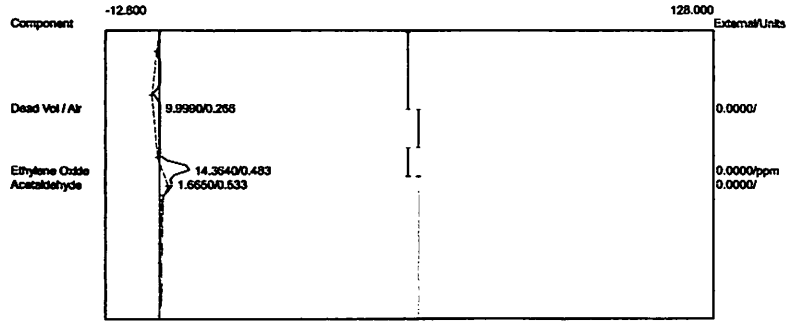
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	7.5355	0.0000	
Ethylene Oxide	0.450	14.6410	0.0000	ppm
Acetaldehyde	0.516	1.8560	0.0000	
		24.0325	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:52:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C06.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



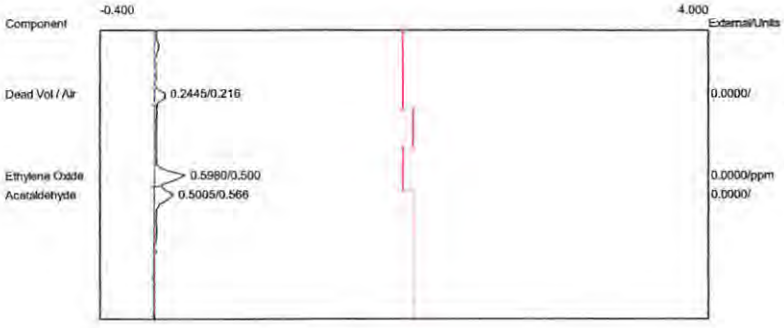
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	0.2010	0.0000	
Ethylene Oxide	0.500	5.1100	0.0000	ppm
		5.3110	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:52:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C06.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



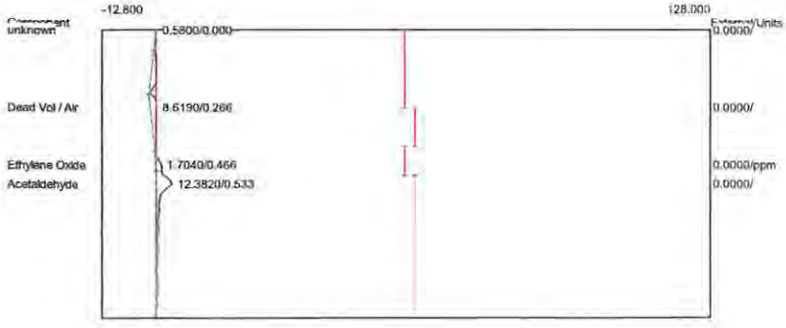
Component	Retention	Area	External	Units
Dead Vol / Air	0.266	9.9990	0.0000	
Ethylene Oxide	0.483	14.3640	0.0000	ppm
Acetaldehyde	0.533	1.6650	0.0000	
		26.0280	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:58:45
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C07.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



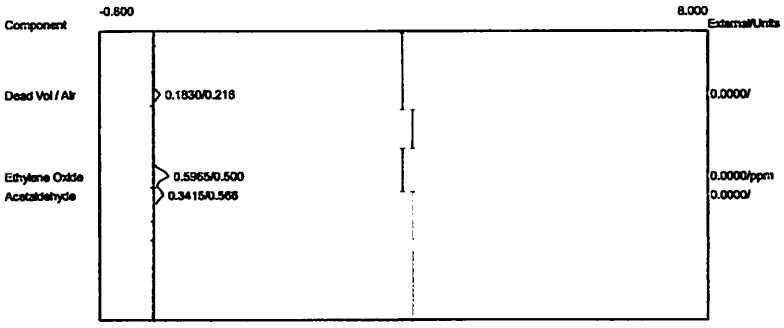
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.2445	0.0000	
Ethylene Oxide	0.500	0.5980	0.0000	ppm
Acetaldehyde	0.566	0.5005	0.0000	
		1.3430	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 07:58:45
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C07.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



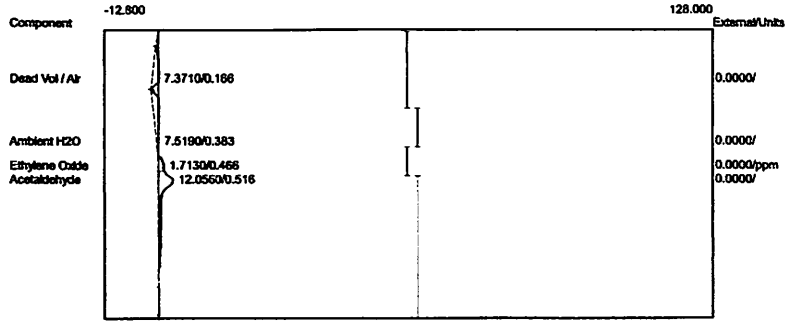
Component	Retention	Area	External	Units
Dead Vol / Air	0.266	8.6190	0.0000	
Ethylene Oxide	0.466	1.7040	0.0000	ppm
Acetaldehyde	0.533	12.3820	0.0000	
		22.7050	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 08:04:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C08.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



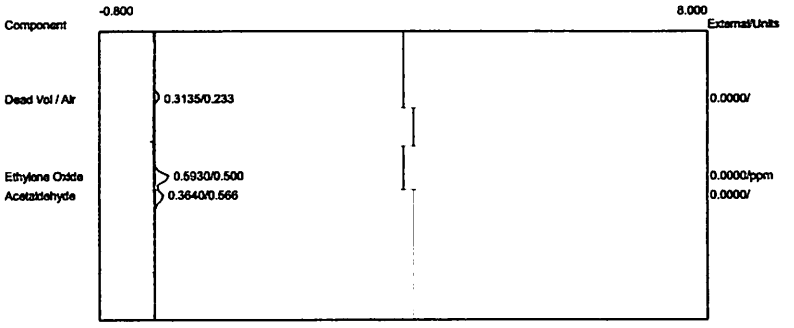
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.1830	0.0000	
Ethylene Oxide	0.500	0.5965	0.0000	ppm
Acetaldehyde	0.566	0.3415	0.0000	
		1.1210	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 08:04:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C08.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



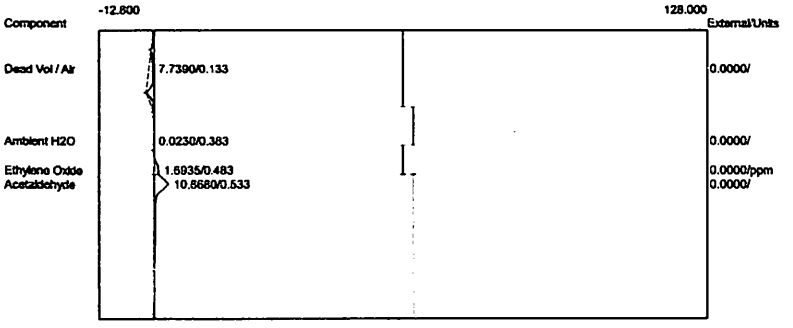
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	7.3710	0.0000	
Ambient H2O	0.383	7.5190	0.0000	
Ethylene Oxide	0.466	1.7130	0.0000	ppm
Acetaldehyde	0.516	12.0560	0.0000	
		28.6590	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 08:10:17
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-C09.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



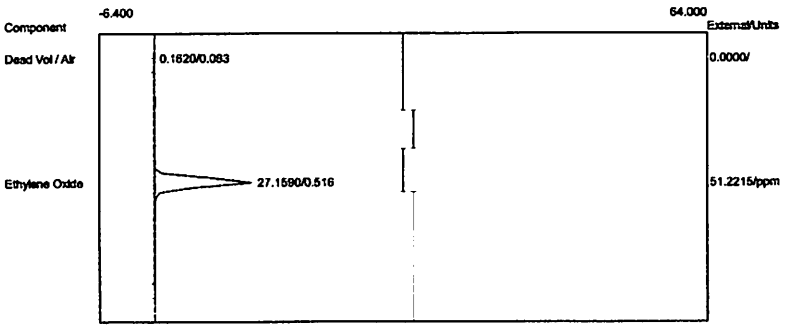
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	0.3135	0.0000	
Ethylene Oxide	0.500	0.5930	0.0000	ppm
Acetaldehyde	0.566	0.3640	0.0000	
		1.2705	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 08:10:17
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-C09.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



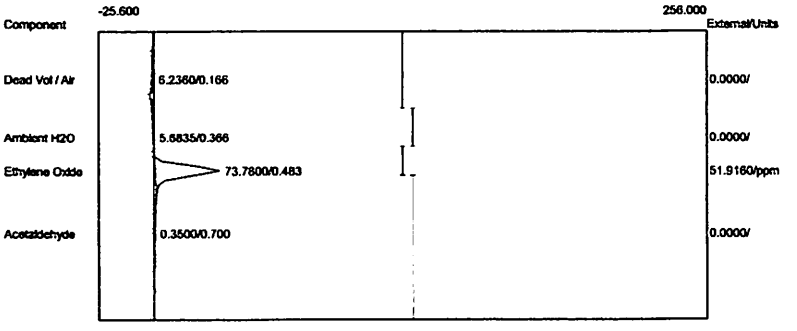
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	7.7390	0.0000	
Ambient H2O	0.383	0.0230	0.0000	
Ethylene Oxide	0.483	1.6935	0.0000	ppm
Acetaldehyde	0.533	10.8680	0.0000	
		20.3235	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 08:37:16
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-Audit.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



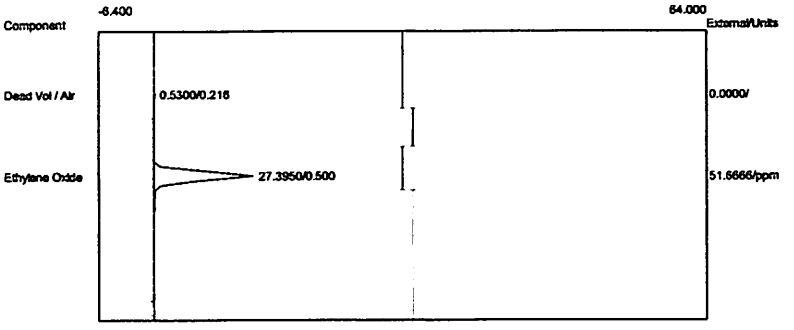
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	0.1620	0.0000	
Ethylene Oxide	0.516	27.1590	51.2215	ppm
		27.3210	51.2215	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/06/2020 08:37:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-Audit.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



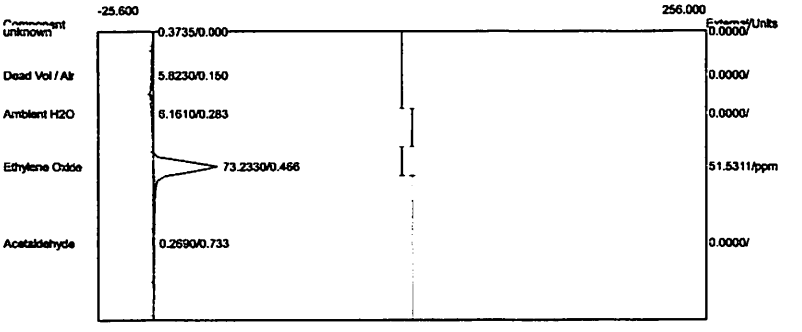
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	6.2360	0.0000	
Ambient H2O	0.366	5.6835	0.0000	
Ethylene Oxide	0.483	73.7800	51.9160	ppm
Acetaldehyde	0.700	0.3500	0.0000	
		86.0495	51.9160	

Lab name: ECSI
Client: Cook - Ellettsville, IN
Client ID: PostCal
Analysis date: 02/06/2020 17:46:09
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-PAudit.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.5300	0.0000	
Ethylene Oxide	0.500	27.3950	51.6666	ppm
		27.9250	51.6666	

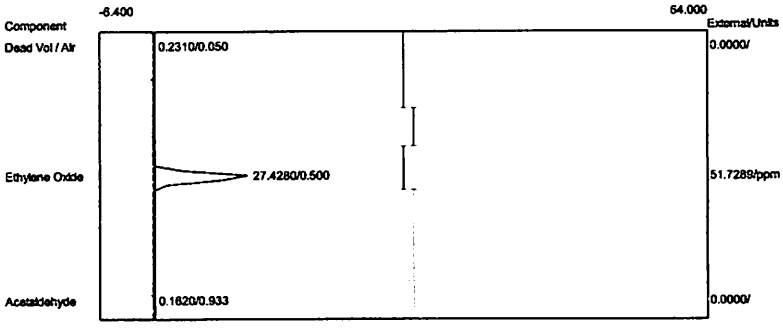
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PostCal
Analysis date: 02/06/2020 17:46:09
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-PAudit.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.150	5.8230	0.0000	
Ambient H2O	0.283	6.1610	0.0000	
Ethylene Oxide	0.466	73.2330	51.5311	ppm
Acetaldehyde	0.733	0.2690	0.0000	
		85.4860	51.5311	

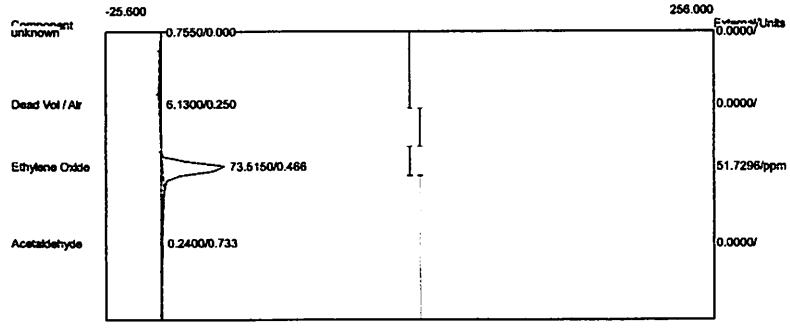
AUDIT CHECK

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/07/2020 09:07:32
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-Audit2.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.050	0.2310	0.0000	
Ethylene Oxide	0.500	27.4280	51.7289	ppm
Acetaldehyde	0.933	0.1620	0.0000	
		27.8210	51.7289	

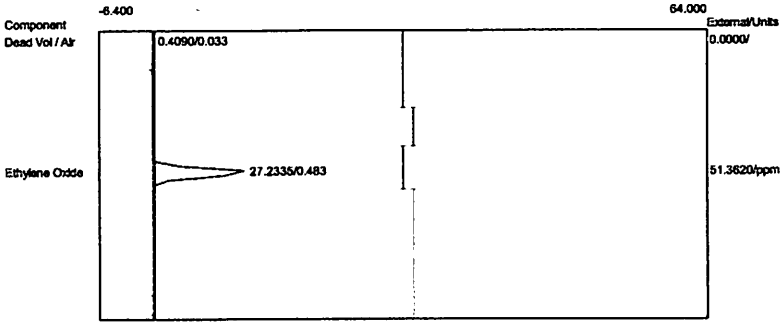
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PreCal
Analysis date: 02/07/2020 09:07:32
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-Audit2.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.250	6.1300	0.0000	
Ethylene Oxide	0.466	73.5150	51.7296	ppm
Acetaldehyde	0.733	0.2400	0.0000	
		79.8850	51.7296	

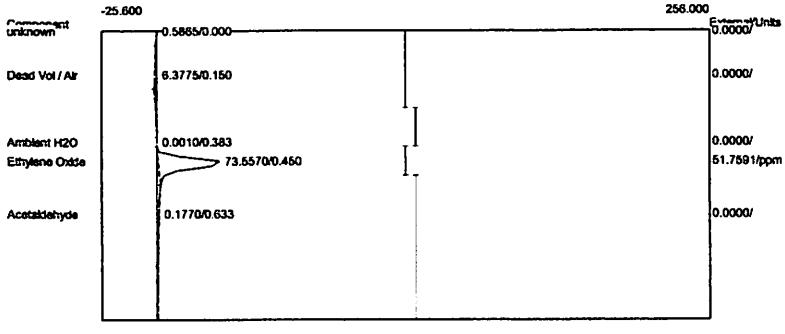
7-7 - Audit check

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PostCal
Analysis date: 02/07/2020 17:03:01
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-PAudit2.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.033	0.4090	0.0000	
Ethylene Oxide	0.483	27.2335	51.3620	ppm
		27.6425	51.3620	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: PostCal
Analysis date: 02/07/2020 17:03:01
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-PAudit2.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.150	6.3775	0.0000	
Ambient H2O	0.383	0.0010	0.0000	
Ethylene Oxide	0.450	73.5570	51.7591	ppm
Acetaldehyde	0.633	0.1770	0.0000	
		80.1125	51.7591	

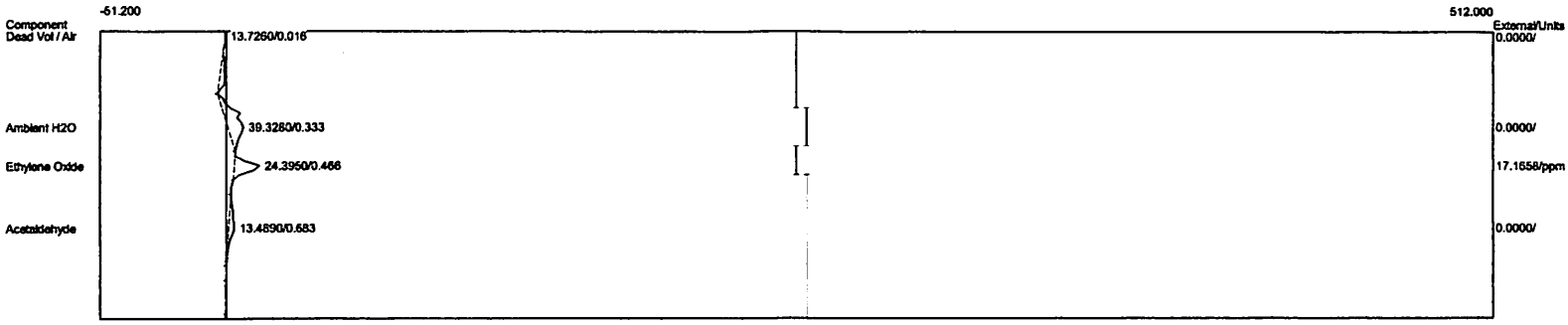
APPENDIX F

GAS CHROMATOGRAMS

SCV Test #1

Sterilizers S1, S3, S8 & S9

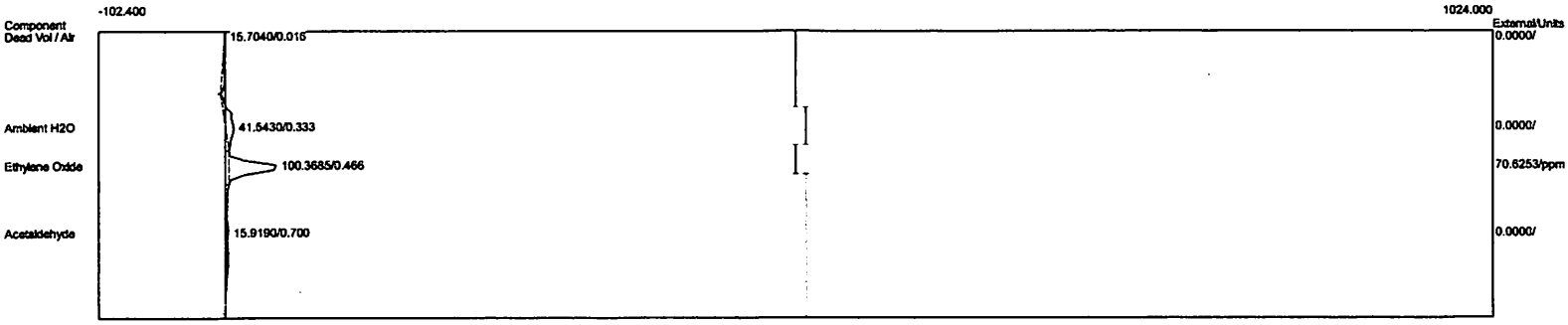
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:23:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E14.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	13.7260	0.0000	
Ambient H2O	0.333	39.3280	0.0000	
Ethylene Oxide	0.466	24.3950	17.1658	ppm
Acetaldehyde	0.683	13.4890	0.0000	
		90.9380	17.1658	

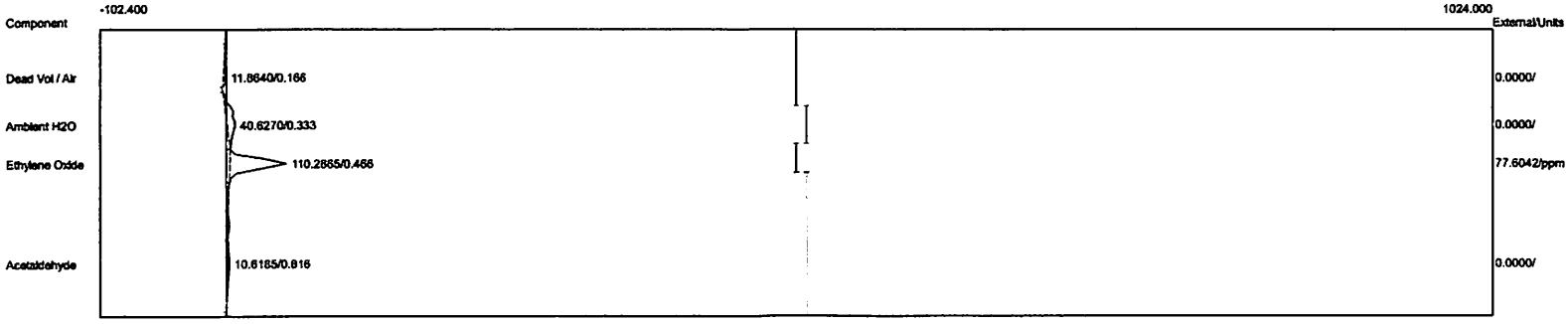
2/6/2020
SCV - Chamber 51, 53, 58, 59
2:04 - 2:22
wet scrubber test

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:21:43
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E13.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



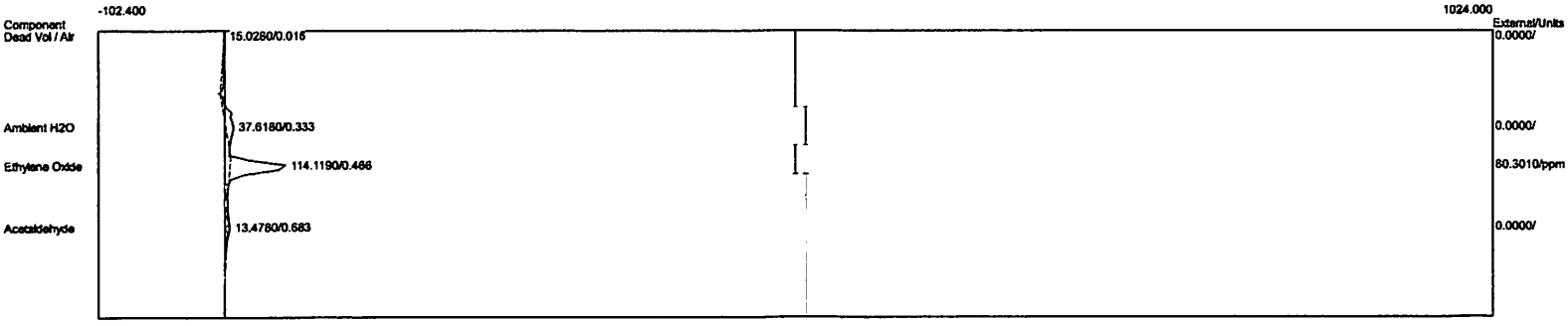
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	15.7040	0.0000	
Ambient H2O	0.333	41.5430	0.0000	
Ethylene Oxide	0.466	100.3685	70.6253	ppm
Acetaldehyde	0.700	15.9190	0.0000	
		173.5345	70.6253	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:20:27
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E12.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



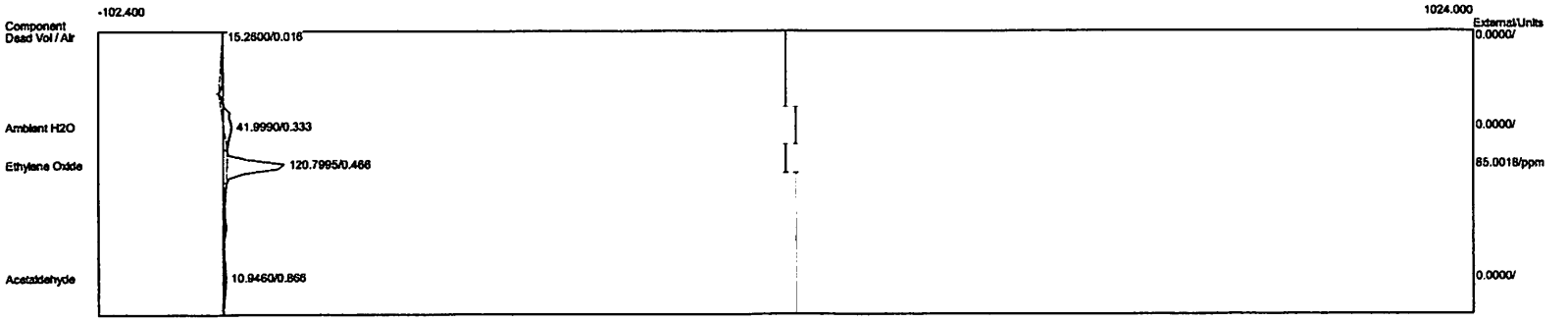
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	11.8640	0.0000	
Ambient H2O	0.333	40.6270	0.0000	
Ethylene Oxide	0.466	110.2865	77.6042	ppm
Acetaldehyde	0.816	10.6185	0.0000	
		173.3960	77.6042	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:19:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E11.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



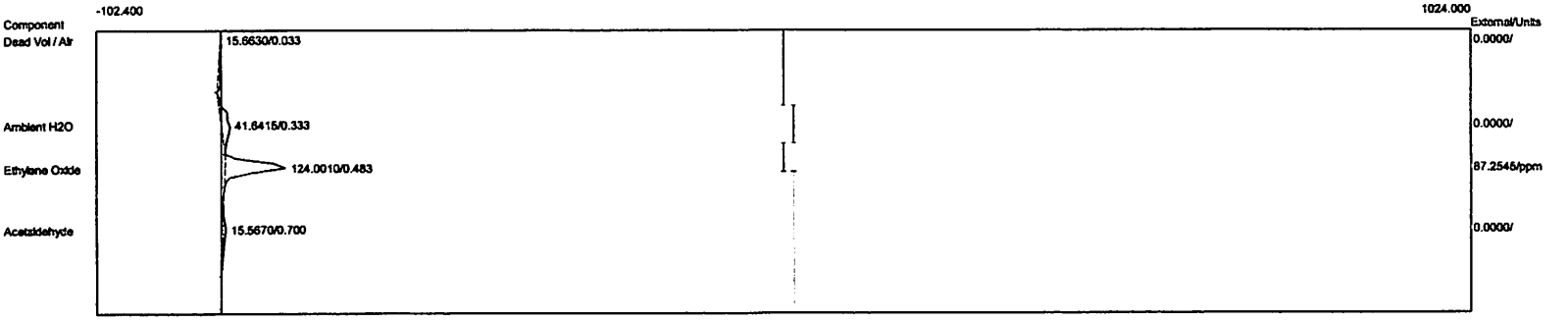
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	15.0280	0.0000	
Ambient H2O	0.333	37.6180	0.0000	
Ethylene Oxide	0.466	114.1190	80.3010	ppm
Acetaldehyde	0.683	13.4780	0.0000	
		180.2430	80.3010	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:17:48
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E10.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



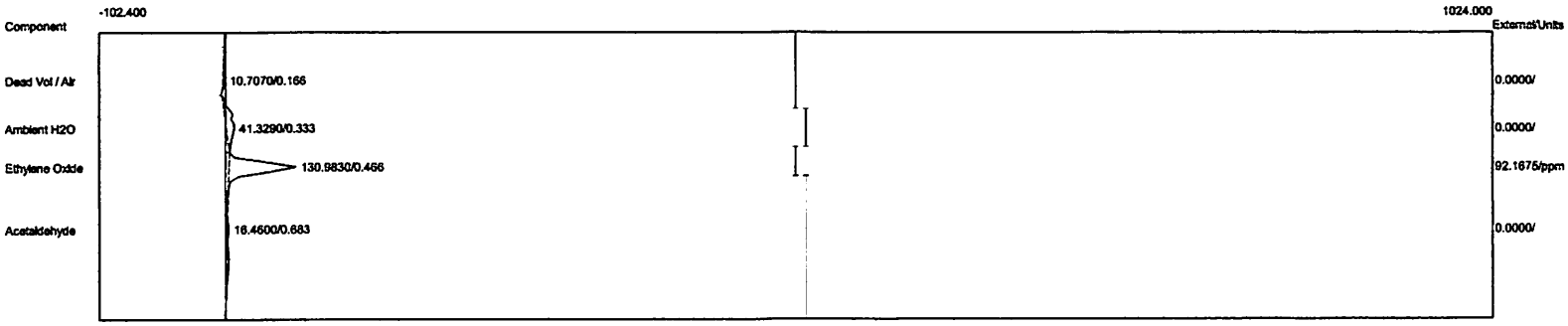
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	15.2600	0.0000	
Ambient H2O	0.333	41.9990	0.0000	
Ethylene Oxide	0.466	120.7995	85.0018	ppm
Acetaldehyde	0.866	10.9460	0.0000	
		189.0045	85.0018	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:16:36
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E09.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



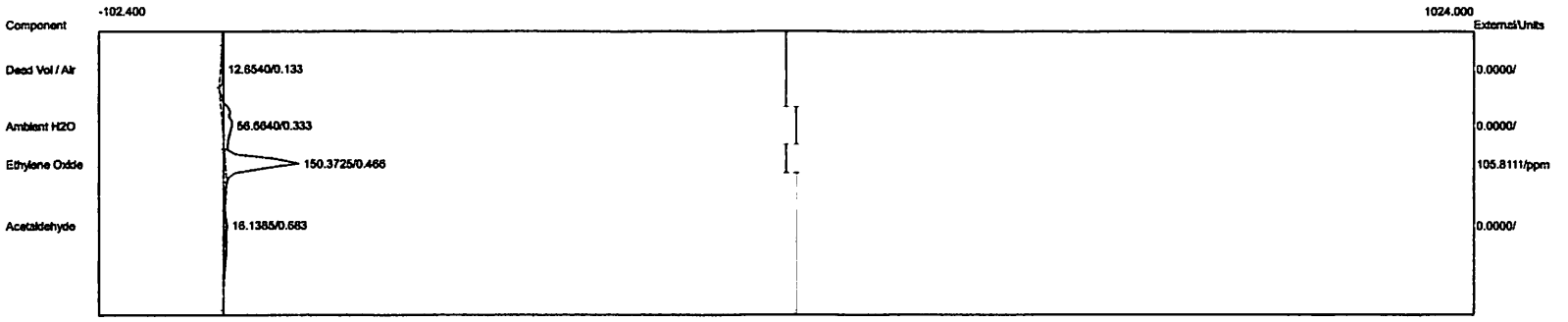
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	15.6630	0.0000	
Ambient H2O	0.333	41.6415	0.0000	
Ethylene Oxide	0.483	124.0010	87.2545	ppm
Acetaldehyde	0.700	15.5670	0.0000	
		196.8725	87.2545	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Ahalysis date: 02/06/2020 14:15:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E08.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



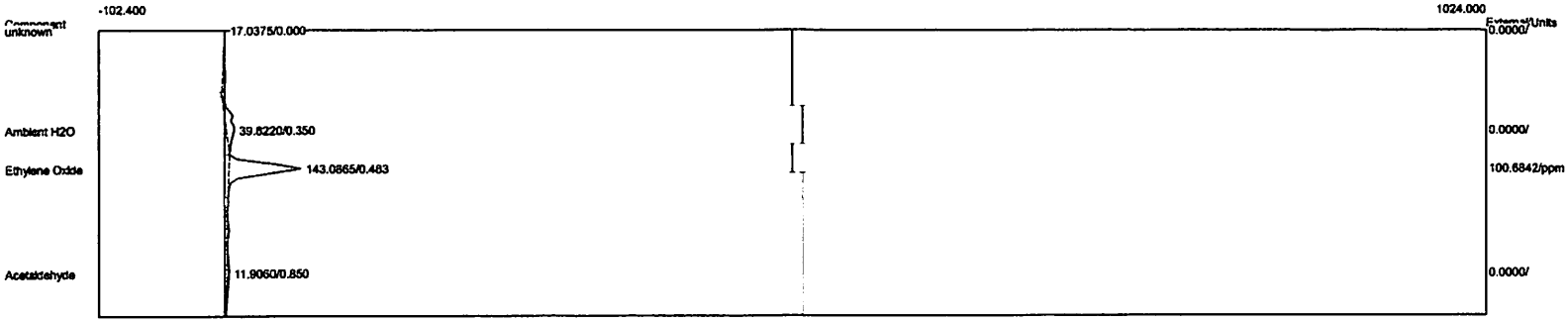
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	10.7070	0.0000	
Ambient H2O	0.333	41.3290	0.0000	
Ethylene Oxide	0.466	130.9830	92.1675	ppm
Acetaldehyde	0.683	16.4600	0.0000	
		199.4790	92.1675	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:12:46
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E06.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



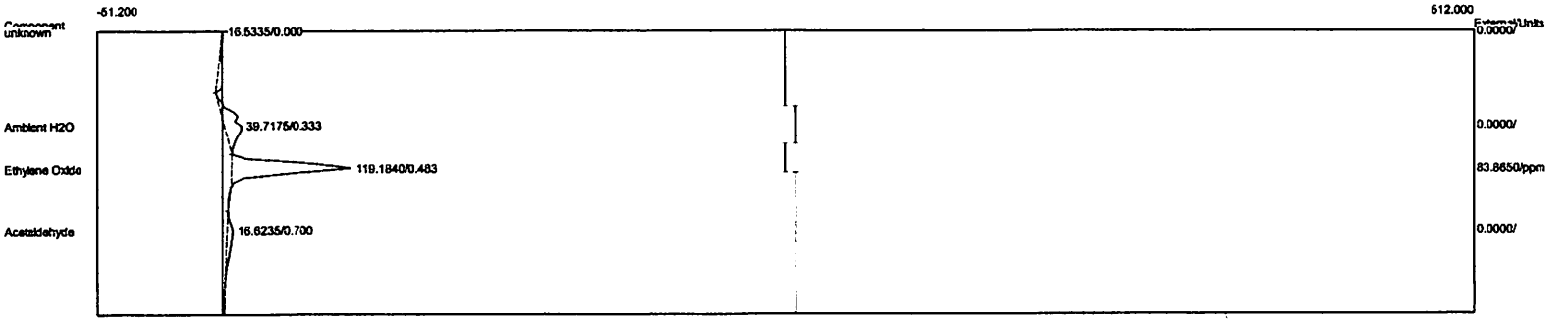
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	12.8540	0.0000	
Ambient H2O	0.333	56.6640	0.0000	
Ethylene Oxide	0.466	150.3725	105.8111	ppm
Acetaldehyde	0.683	16.1385	0.0000	
		236.0290	105.8111	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:11:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E05.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



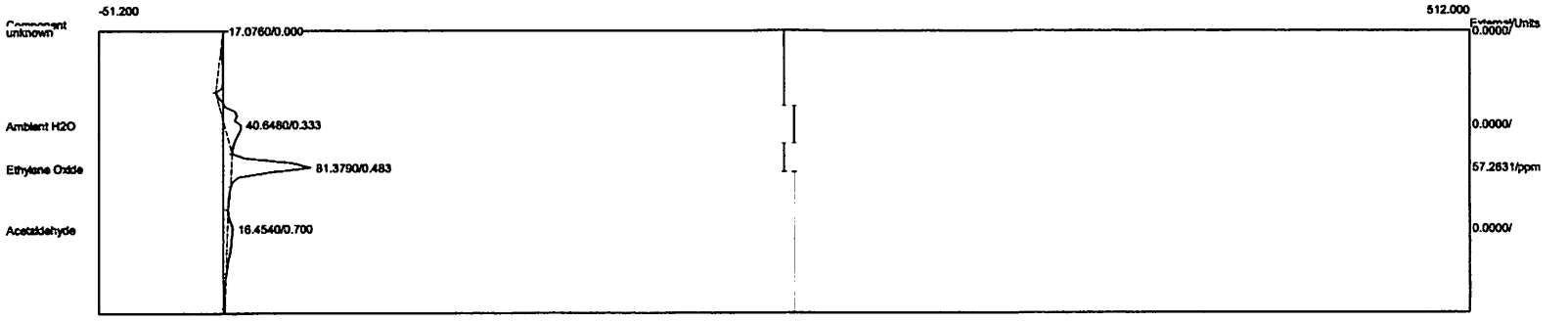
Component	Retention	Area	External	Units
Ambient H2O	0.350	39.8220	0.0000	
Ethylene Oxide	0.483	143.0865	100.6842	ppm
Acetaldehyde	0.850	11.9060	0.0000	
		194.8145	100.6842	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:10:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E04.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



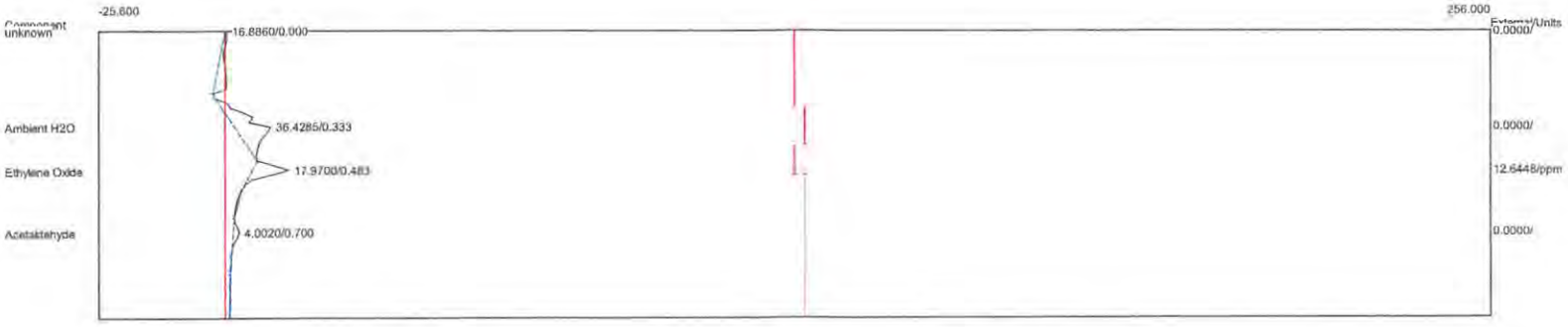
Component	Retention	Area	External	Units
Ambient H2O	0.333	39.7175	0.0000	
Ethylene Oxide	0.483	119.1840	83.8650	ppm
Acetaldehyde	0.700	16.6235	0.0000	
		175.5250	83.8650	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:08:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E03.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



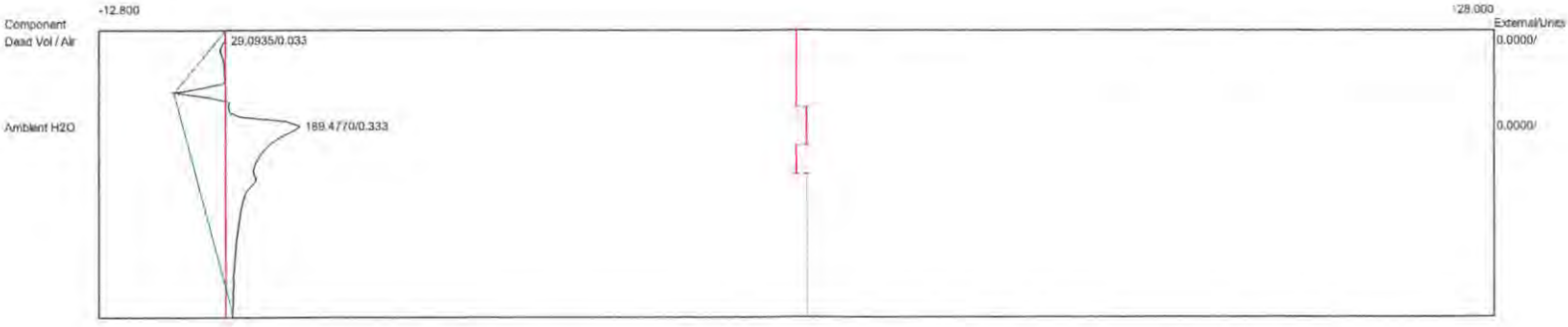
Component	Retention	Area	External	Units
Ambient H2O	0.333	40.6480	0.0000	
Ethylene Oxide	0.483	81.3790	57.2631	ppm
Acetaldehyde	0.700	16.4540	0.0000	
		138.4810	57.2631	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:07:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E02.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.333	36.4285	0.0000	
Ethylene Oxide	0.483	17.9700	12.6448	ppm
Acetaldehyde	0.700	4.0020	0.0000	
		58.4005	12.6448	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Exh
Analysis date: 02/06/2020 14:05:56
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1E01.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer

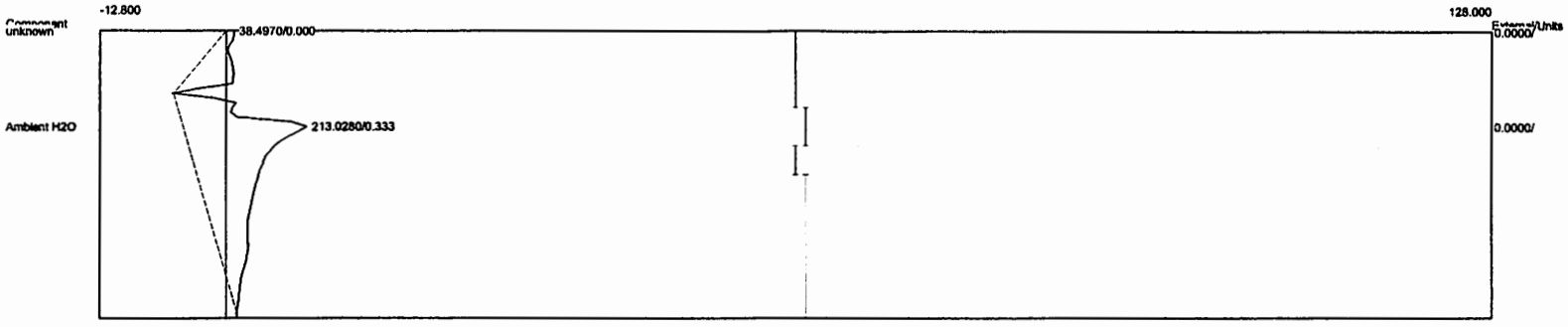


Component	Retention	Area	External	Units
Dead Vol / Air	0.033	29.0935	0.0000	
Ambient H2O	0.333	189.4770	0.0000	
		218.5705	0.0000	

SCV Test #2

Sterilizer S8

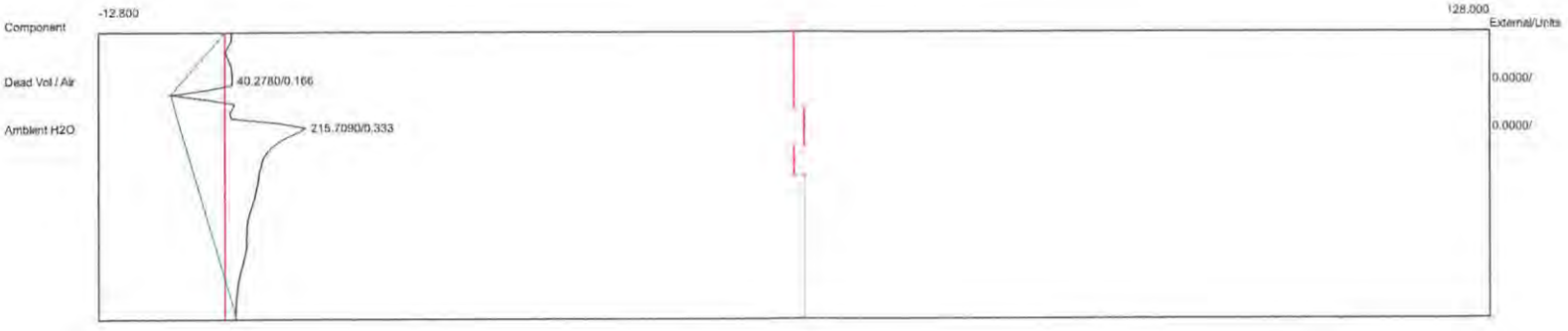
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:20:51
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E13.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.333	213.0280	0.0000	
		213.0280	0.0000	

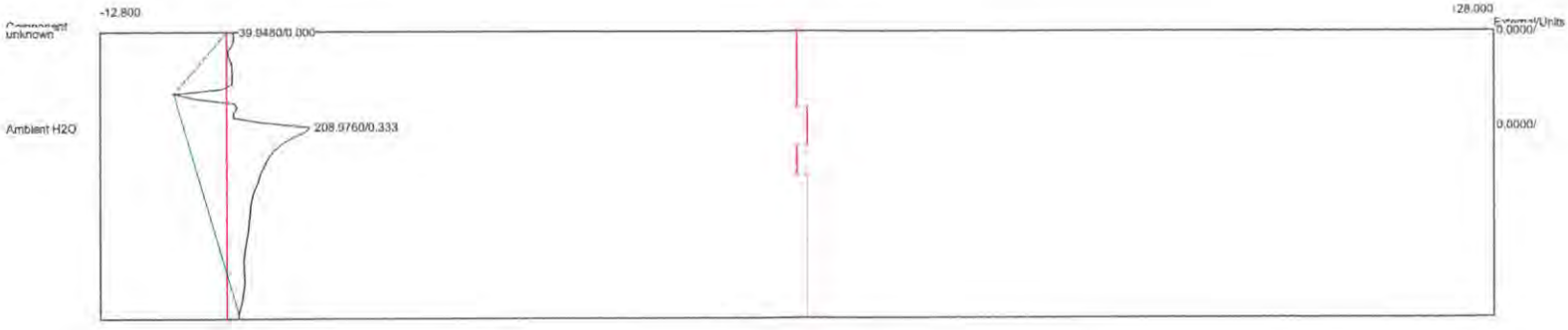
SCV Test #2 (2/7/2020)
Chamber 8

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:19:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E12.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



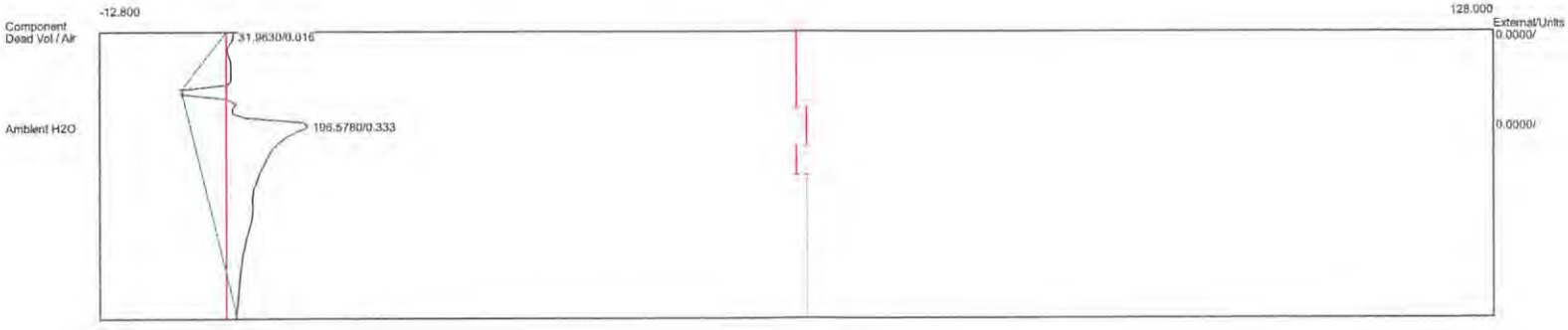
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	40.2780	0.0000	
Ambient H2O	0.333	215.7090	0.0000	
		255.9870	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:18:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E11.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



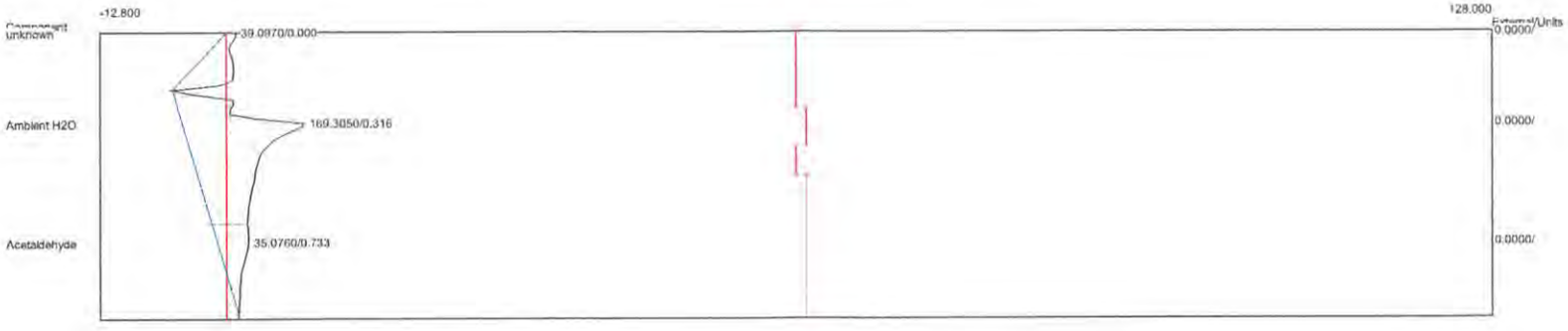
Component	Retention	Area	External	Units
Ambient H2O	0.333	208.9760	0.0000	
		208.9760	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:17:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E10.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



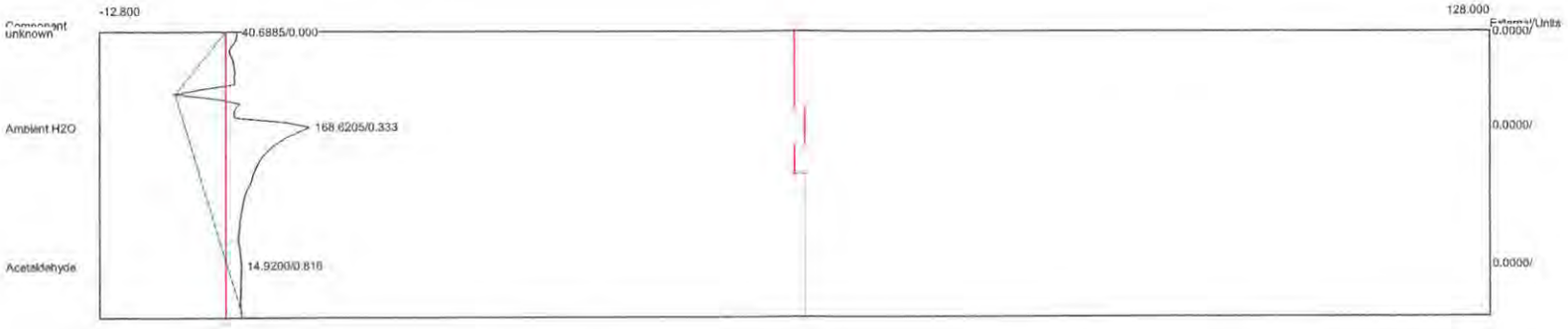
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	31.9630	0.0000	
Ambient H2O	0.333	196.5780	0.0000	
		228.5410	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:15:38
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E09.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



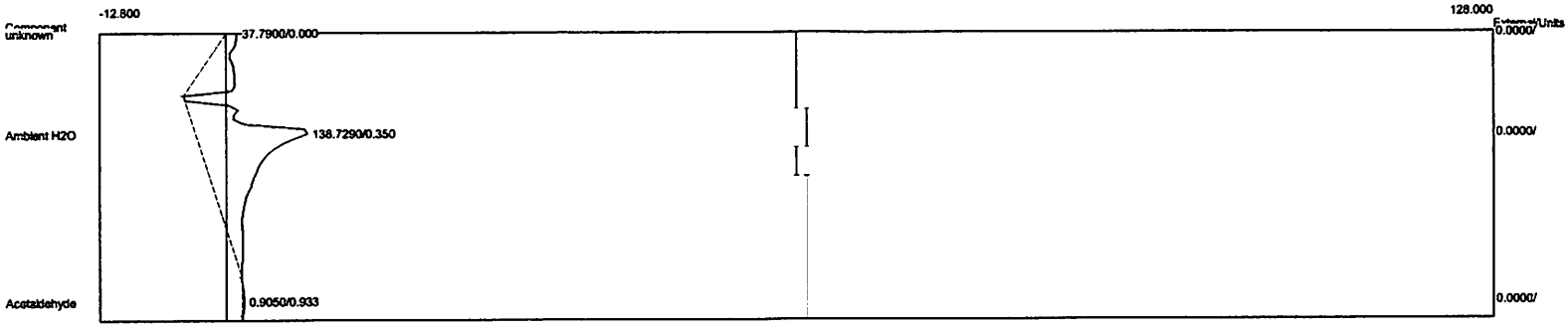
Component	Retention	Area	External	Units
Ambient H2O	0.316	169.3050	0.0000	
Acetaldehyde	0.733	35.0760	0.0000	
		204.3810	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:14:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E08.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



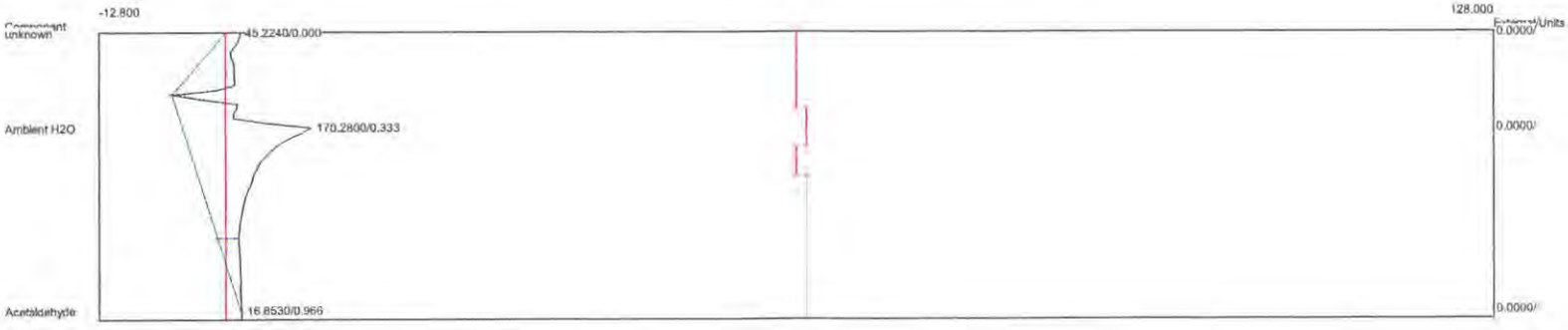
Component	Retention	Area	External	Units
Ambient H2O	0.333	168.6205	0.0000	
Acetaldehyde	0.816	14.9200	0.0000	
		183.5405	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:13:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E07.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



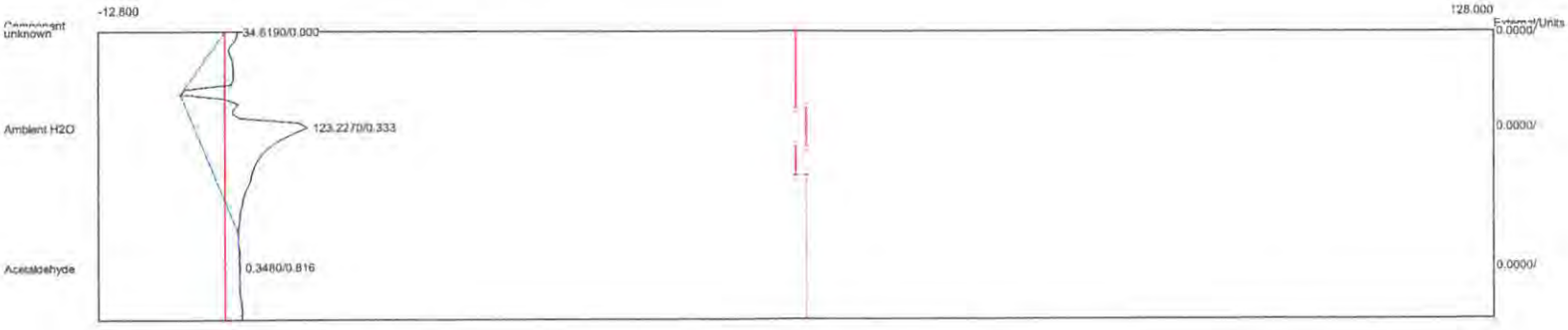
Component	Retention	Area	External	Units
Ambient H2O	0.350	138.7290	0.0000	
Acetaldehyde	0.933	0.9050	0.0000	
		139.6340	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:12:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E06.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



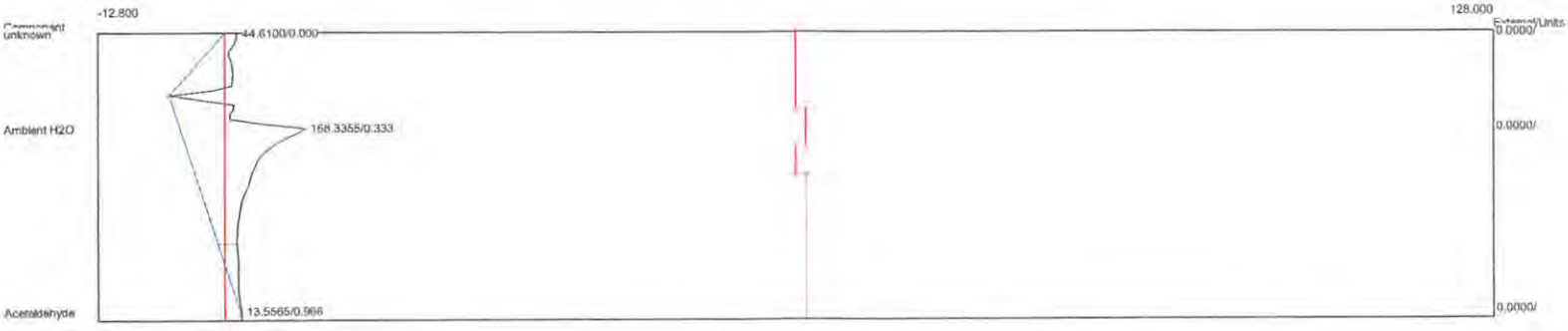
Component	Retention	Area	External	Units
Ambient H2O	0.333	170.2800	0.0000	
Acetaldehyde	0.966	16.8530	0.0000	
		187.1330	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:11:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E05.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



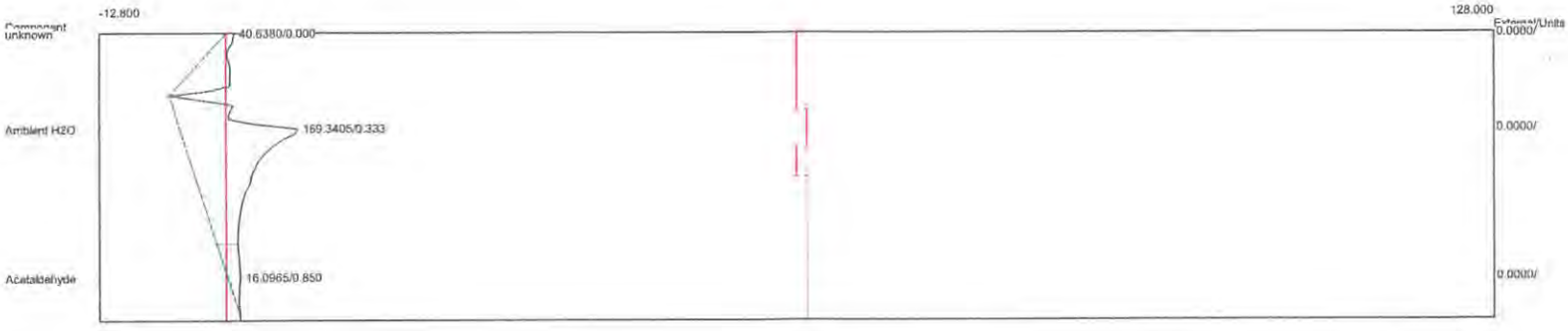
Component	Retention	Area	External	Units
Ambient H2O	0.333	123.2270	0.0000	
Acetaldehyde	0.816	0.3480	0.0000	
		123.5750	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:09:58
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E04.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



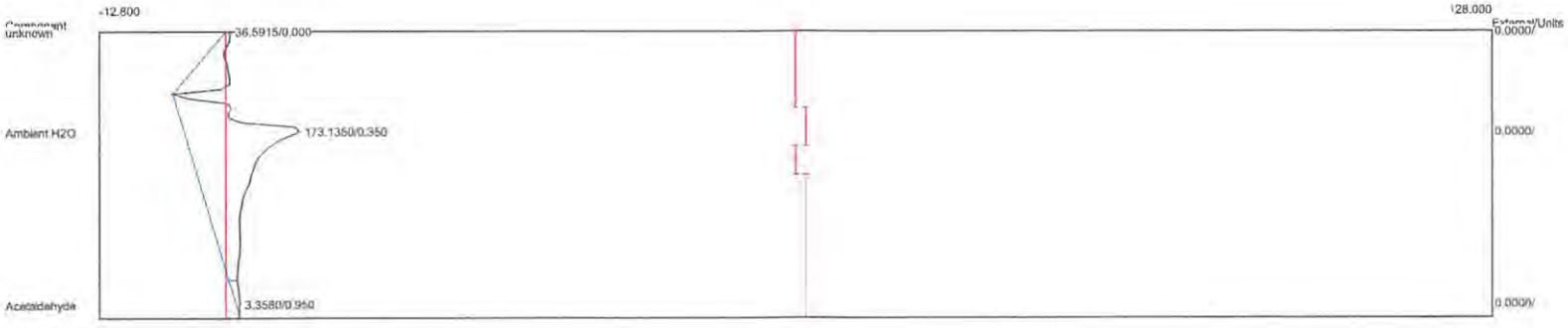
Component	Retention	Area	External	Units
Ambient H2O	0.333	168.3355	0.0000	
Acetaldehyde	0.966	13.5565	0.0000	
		181.8920	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:08:54
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E03.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



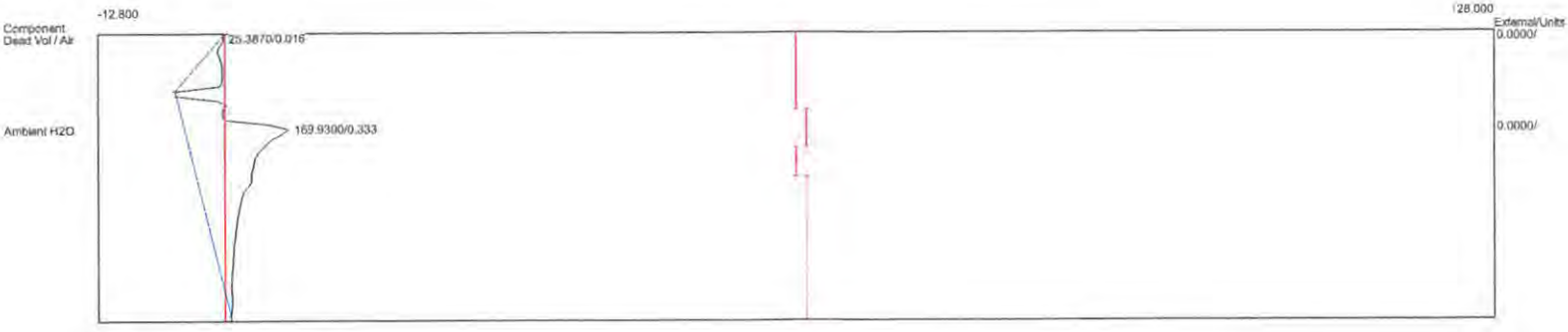
Component	Retention	Area	External	Units
Ambient H2O	0.333	169.3405	0.0000	
Acetaldehyde	0.850	16.0965	0.0000	
		185.4370	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:07:51
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E02.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	173.1350	0.0000	
Acetaldehyde	0.950	3.3580	0.0000	
		176.4930	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Exh
Analysis date: 02/07/2020 15:06:43
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2E01.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer

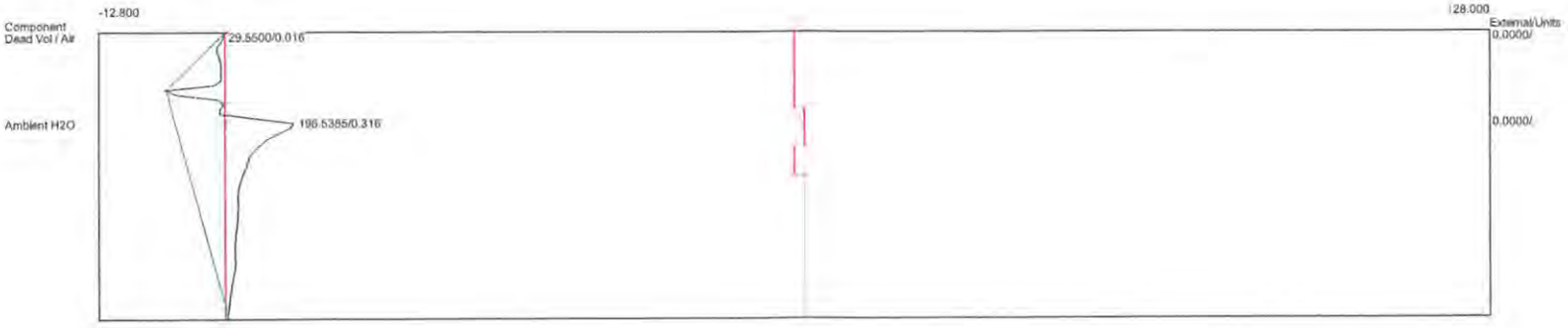


Component	Retention	Area	External	Units
Dead Vol / Air	0.016	25.3870	0.0000	
Ambient H2O	0.333	169.9300	0.0000	
		195.3170	0.0000	

SCV Test #3

Sterilizer S9

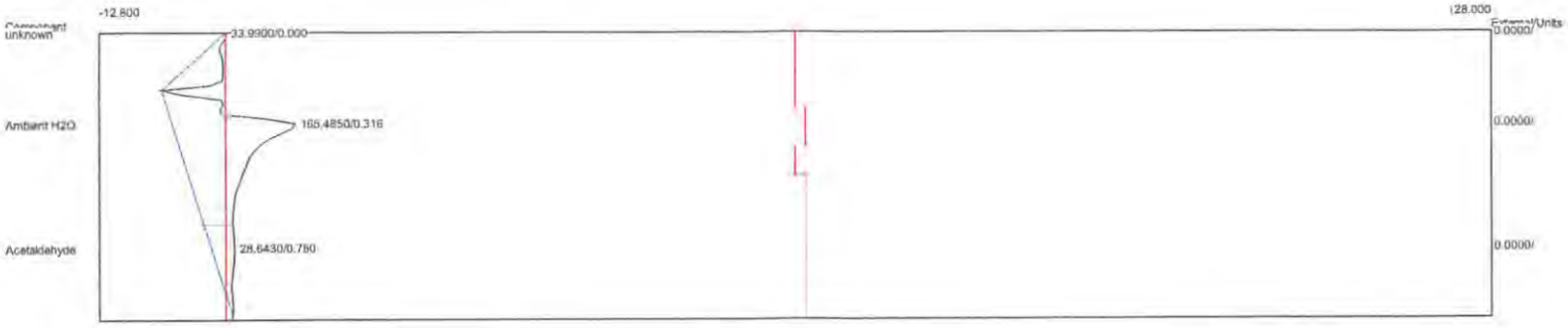
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:40:48
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E14.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	29.5500	0.0000	
Ambient H2O	0.316	196.5385	0.0000	
		226.0885	0.0000	

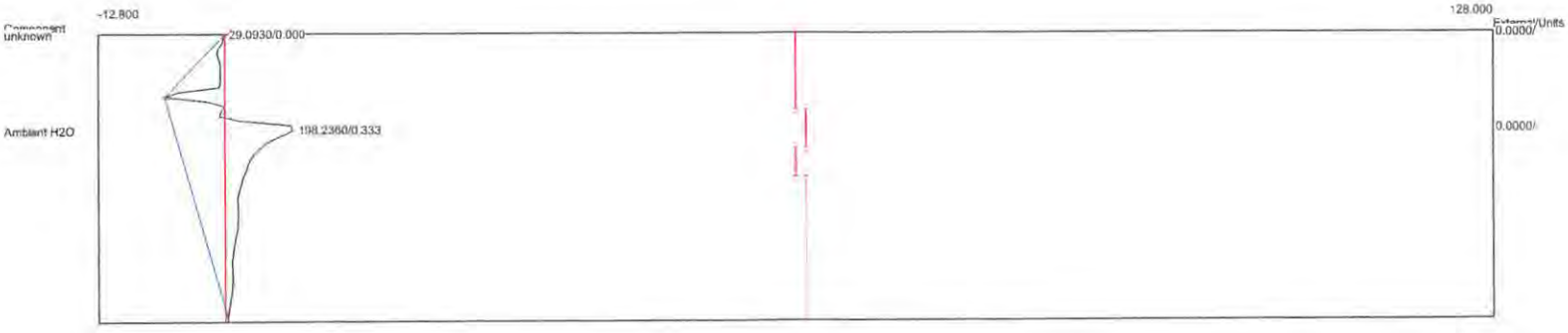
SCC Test #3
Chamber 9 - 2/7/2020

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:39:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E13.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



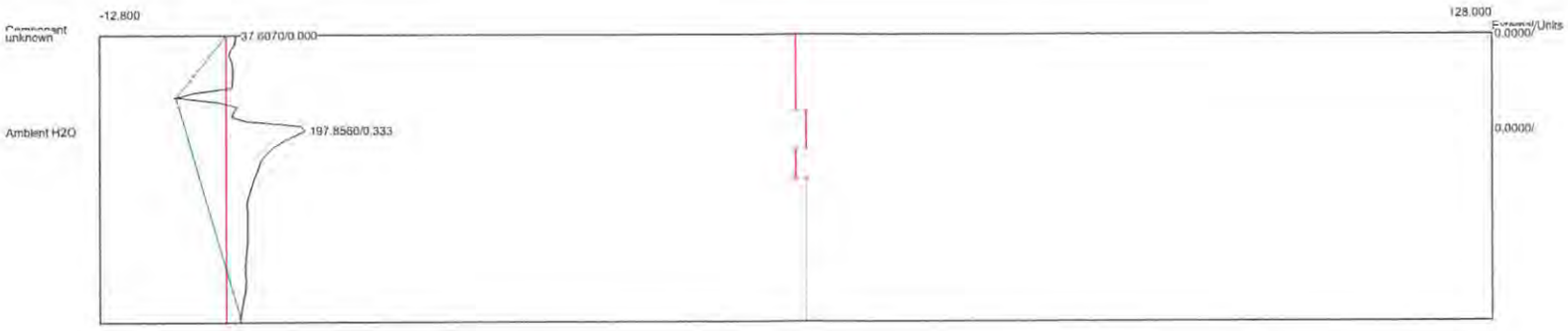
Component	Retention	Area	External	Units
Ambient H2O	0.316	165.4850	0.0000	
Acetaldehyde	0.750	28.6430	0.0000	
		194.1280	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:38:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E12.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



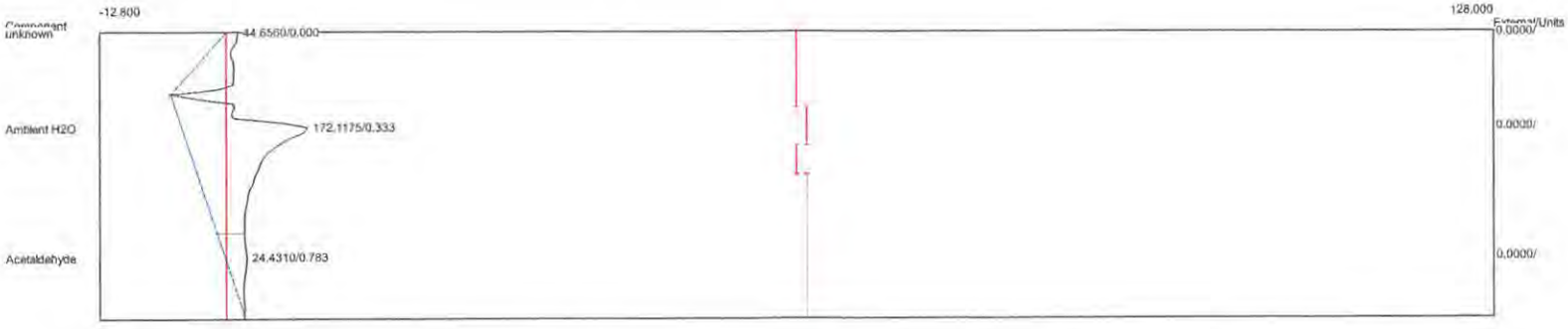
Component	Retention	Area	External	Units
Ambient H2O	0.333	198.2360	0.0000	
		198.2360	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:37:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E11.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



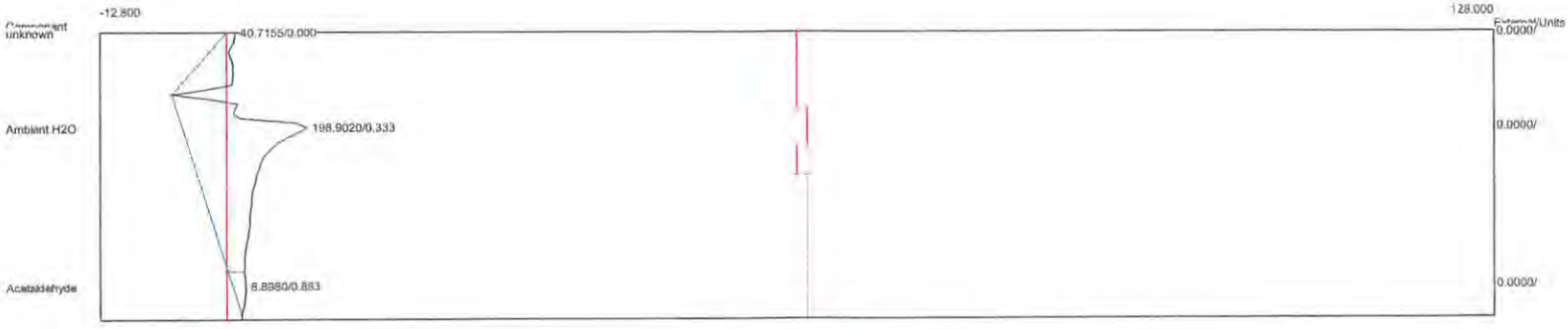
Component	Retention	Area	External	Units
Ambient H2O	0.333	197.8560	0.0000	
		197.8560	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:36:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E10.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



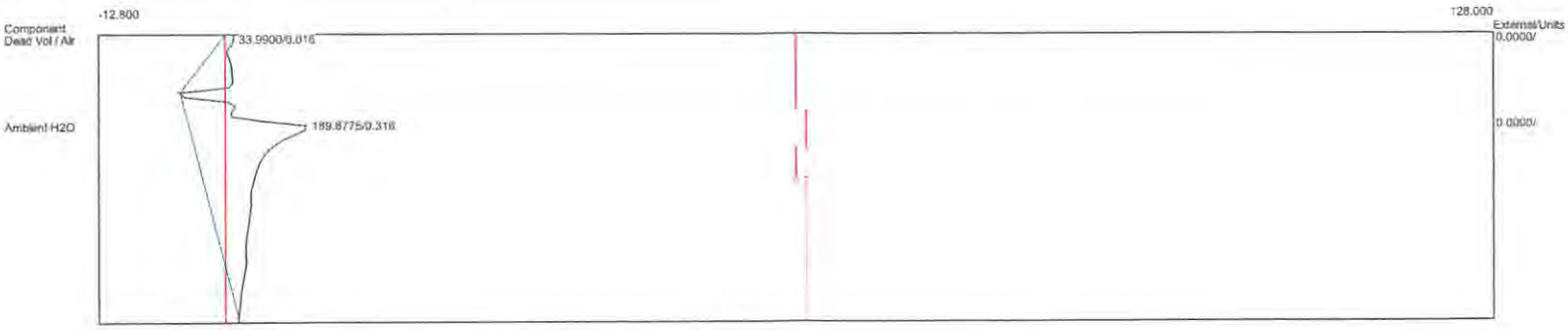
Component	Retention	Area	External	Units
Ambient H2O	0.333	172.1175	0.0000	
Acetaldehyde	0.783	24.4310	0.0000	
		196.5485	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:34:59
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E09.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



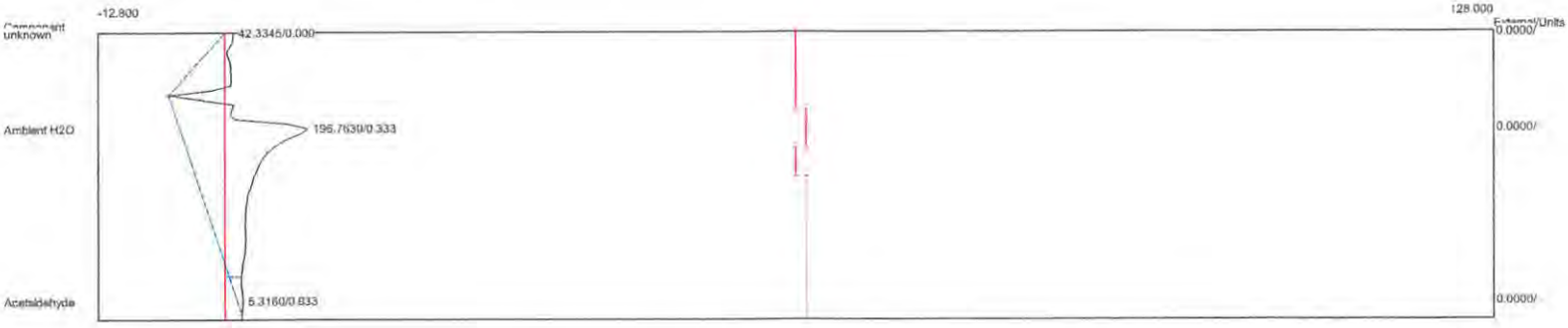
Component	Retention	Area	External	Units
Ambient H2O	0.333	198.9020	0.0000	
Acetaldehyde	0.883	8.8980	0.0000	
		207.8000	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:33:49
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E08.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



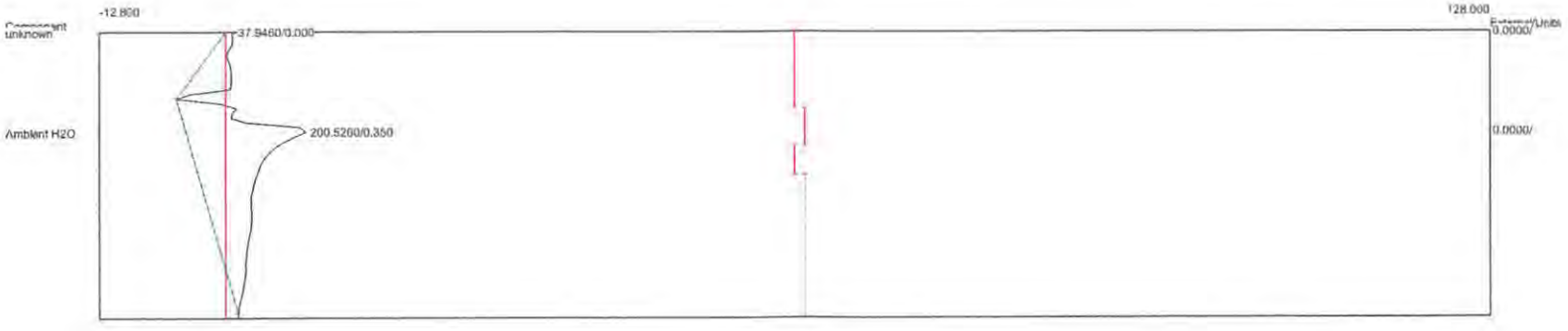
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	33.9900	0.0000	
Ambient H2O	0.316	189.8775	0.0000	
		223.8675	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:32:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E07.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



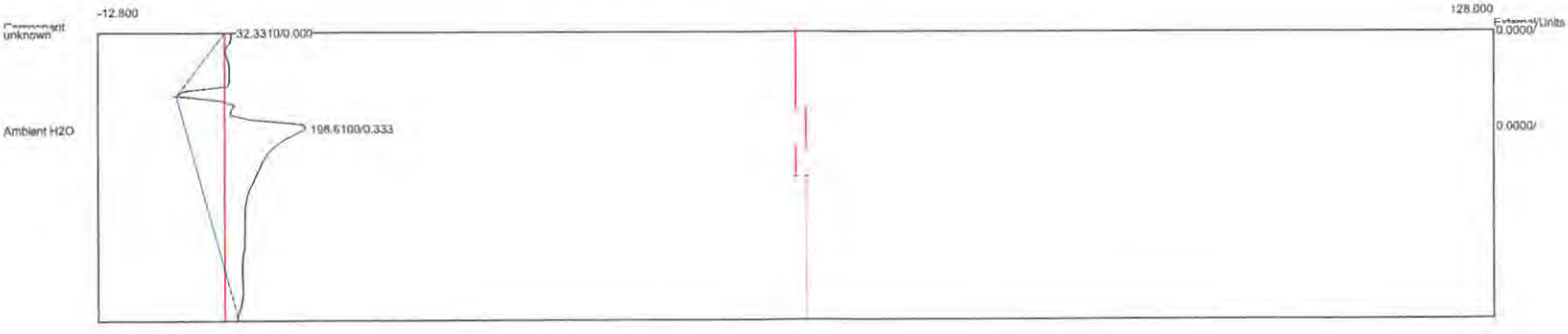
Component	Retention	Area	External	Units
Ambient H2O	0.333	196.7630	0.0000	
Acetaldehyde	0.933	5.3160	0.0000	
		202.0790	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:31:26
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E06.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



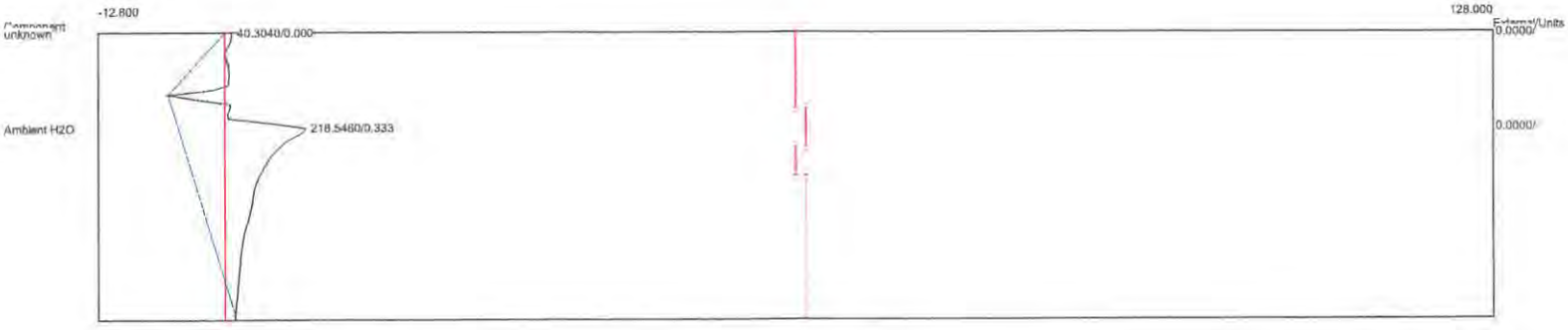
Component	Retention	Area	External	Units
Ambient H2O	0.350	200.5260	0.0000	
		200.5260	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:30:13
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E05.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



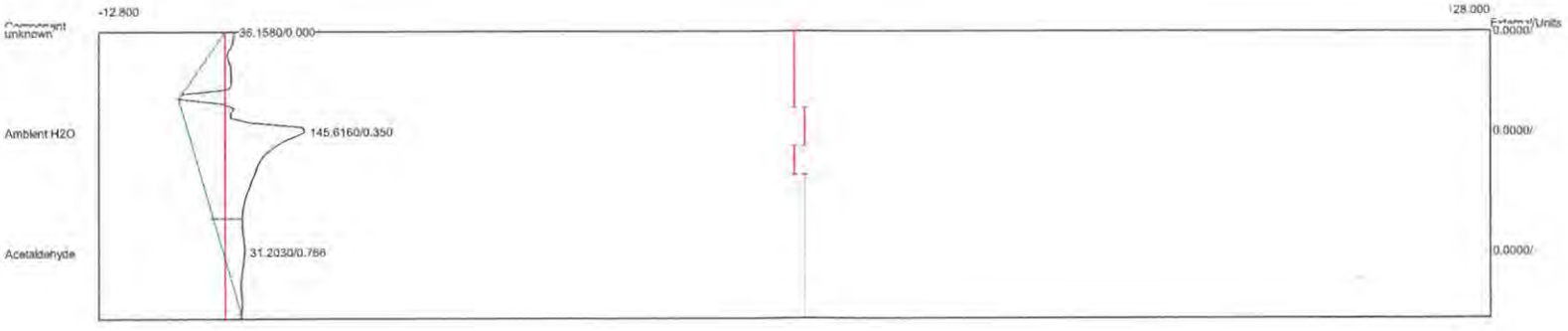
Component	Retention	Area	External	Units
Ambient H2O	0.333	198.6100	0.0000	
		198.6100	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:29:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E04.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



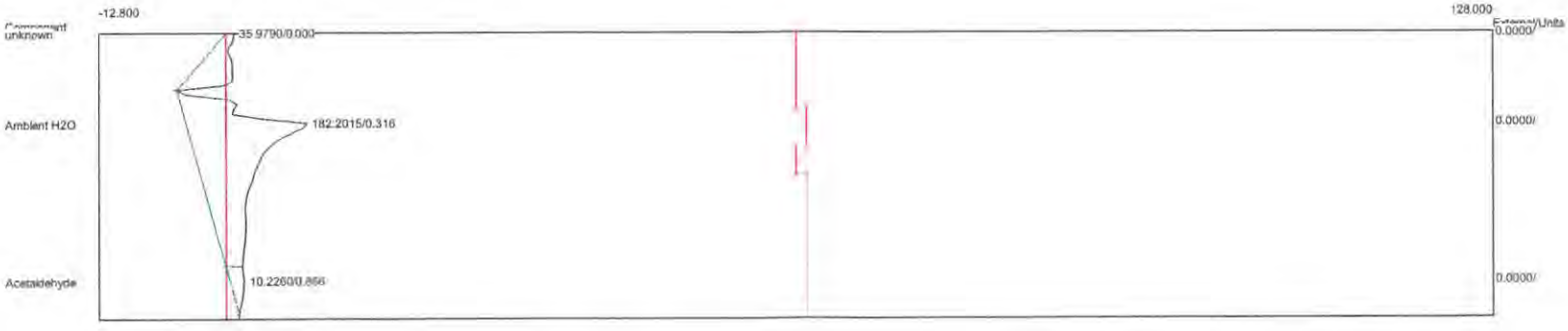
Component	Retention	Area	External	Units
Ambient H2O	0.333	218.5460	0.0000	
		218.5460	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:27:36
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E03.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



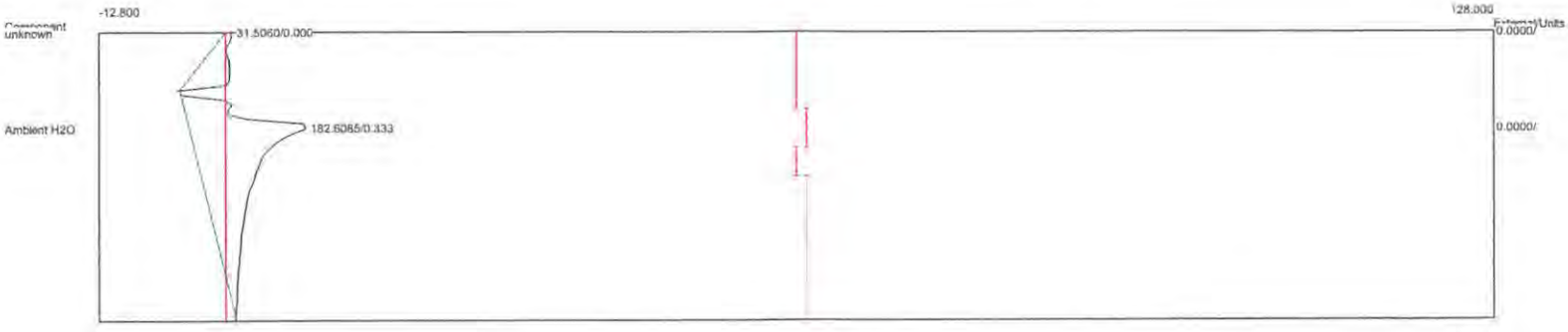
Component	Retention	Area	External	Units
Ambient H2O	0.350	145.6160	0.0000	
Acetaldehyde	0.766	31.2030	0.0000	
		176.8190	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:26:29
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E02.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.316	182.2015	0.0000	
Acetaldehyde	0.866	10.2260	0.0000	
		192.4275	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Exh
Analysis date: 02/07/2020 15:25:19
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3E01.CHR (c:\peak359)
Sample: Packed Tower Outlet
Operator: D. Kremer



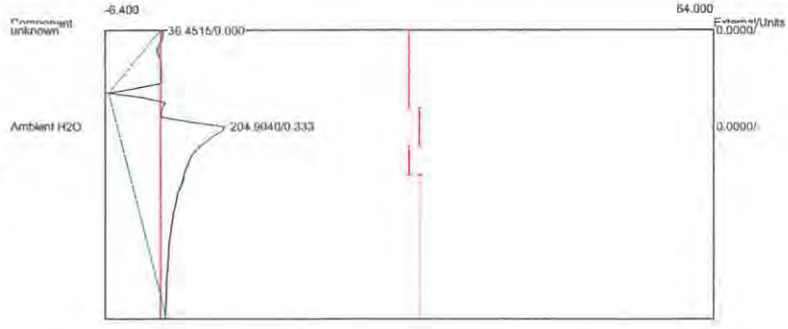
Component	Retention	Area	External	Units
Ambient H2O	0.333	182.6085	0.0000	
		182.6085	0.0000	

ARV Runs #1 through #3

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:17:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A01.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2665	0.0000	
Ethylene Oxide	0.500	16.4035	30.9368	ppm
Acetaldehyde	0.766	0.1580	0.0000	
		18.8280	30.9368	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:17:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A01.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



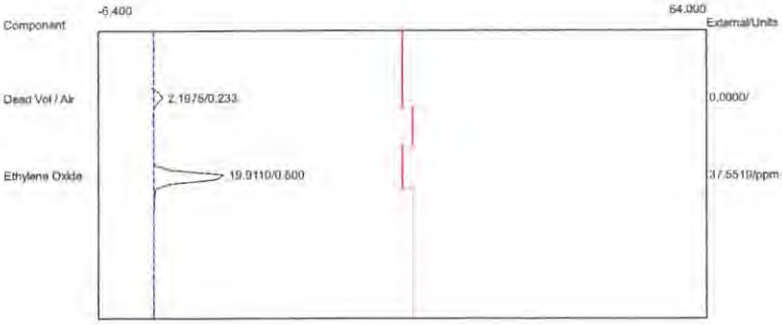
Component	Retention	Area	External	Units
Ambient H2O	0.333	204.9040	0.0000	
		204.9040	0.0000	

2/6/20 2:15 - 10:10 AM

ARV Test #1 - Header B

Hotcells 1, 2, 3, 9, 10 from Chambers 1, 2, 8, 9

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:22:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A02.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

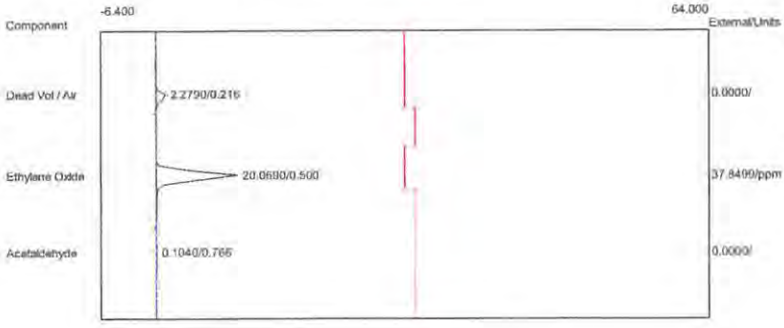


Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1975	0.0000	
Ethylene Oxide	0.500	19.9110	37.5519	ppm
		22.1085	37.5519	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:22:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A02.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	198.2850	0.0000	
		198.2850	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:27:34
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A03.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

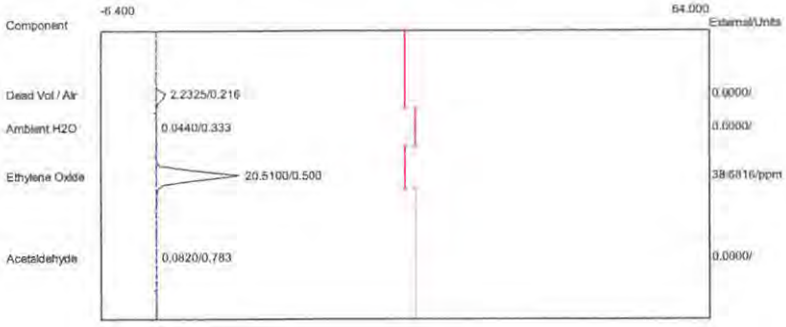


Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2790	0.0000	
Ethylene Oxide	0.500	20.0690	37.8499	ppm
Acetaldehyde	0.766	0.1040	0.0000	
		22.4520	37.8499	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:27:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A03.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.016	32.7275	0.0000	
Ambient H2O	0.333	193.3380	0.0000	
		226.0655	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:32:45
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A04.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

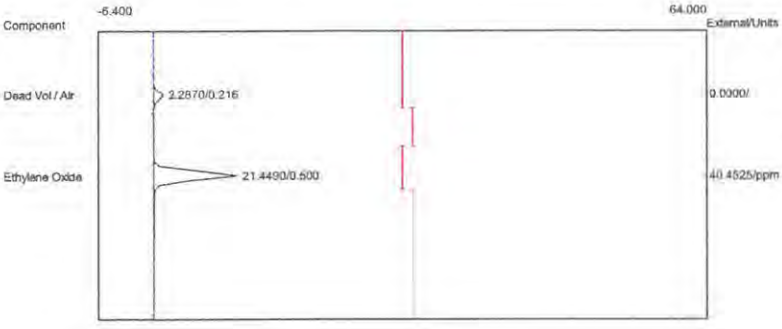


Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2325	0.0000	
Ambient H2O	0.333	0.0440	0.0000	
Ethylene Oxide	0.500	20.5100	38.6816	ppm
Acetaldehyde	0.783	0.0820	0.0000	
		22.8685	38.6816	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:32:45
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A04.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

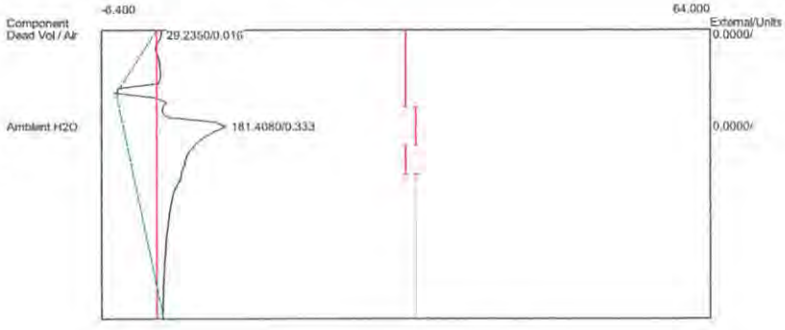
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	33.1010	0.0000	
Ambient H2O	0.333	189.5500	0.0000	
		222.6510	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:37:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A05.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



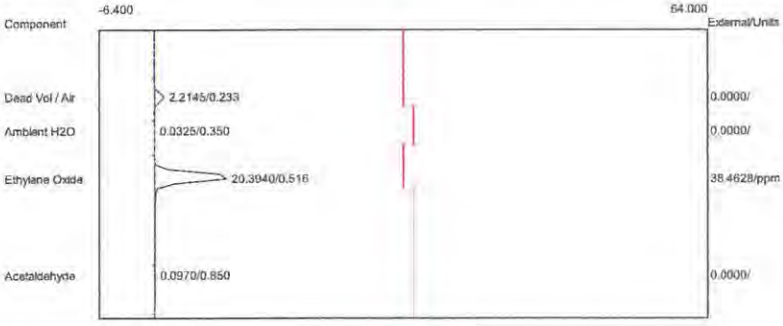
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2870	0.0000	
Ethylene Oxide	0.500	21.4490	40.4525	ppm
		23.7360	40.4525	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:37:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A05.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



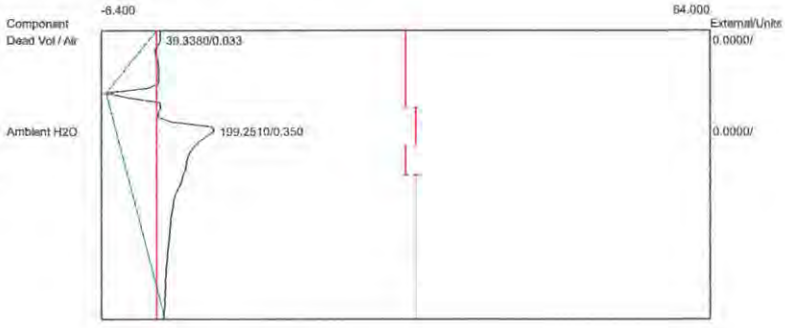
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	29.2350	0.0000	
Ambient H2O	0.333	181.4080	0.0000	
		210.6430	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:42:33
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A06.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



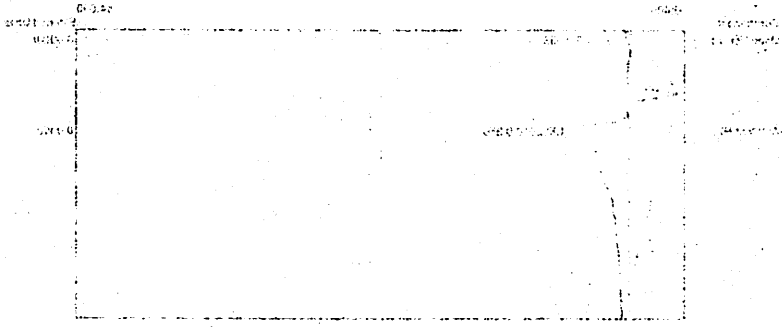
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2145	0.0000	
Ambient H2O	0.350	0.0325	0.0000	
Ethylene Oxide	0.516	20.3940	38.4628	ppm
Acetaldehyde	0.850	0.0970	0.0000	
		22.7380	38.4628	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:42:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A06.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.033	39.3380	0.0000	
Ambient H2O	0.350	199.2510	0.0000	
		238.5890	0.0000	

Lab name: ESSI
Client: Cook - Ellettsville, IN
Client ID: Run#1Air
Analysis date: 02/06/2020 00:42:32
Method: Direct Injection
Description: CHANNEL 1 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: e/o-100.tem
Components: e/o1-100.cpt
Data file: 1Cook2020-1A00 CHR (c:\peak35\)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2145	0.0000	
Ambient H2O	0.350	0.0525	0.0000	
Ethylene Oxide	0.370	1.0 3940	98.4628	ppm
Acetaldehyde	0.850	0.0270	0.0000	
		22.7300	99.4828	

Lab name: ESSI
Client: Cook - Ellettsville, IN
Client ID: Run#1Air
Analysis date: 02/06/2020 00:42:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: e/o-100.tem
Components: e/o2-100.cpt
Data file: 2Cook2020-1A00.CHR (c:\peak35\)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	0.0520	39.3380	0.0000
Ambient H2O	0.350	0.0369	199.2810	0.0000
		0.0889	238.6190	0.0000

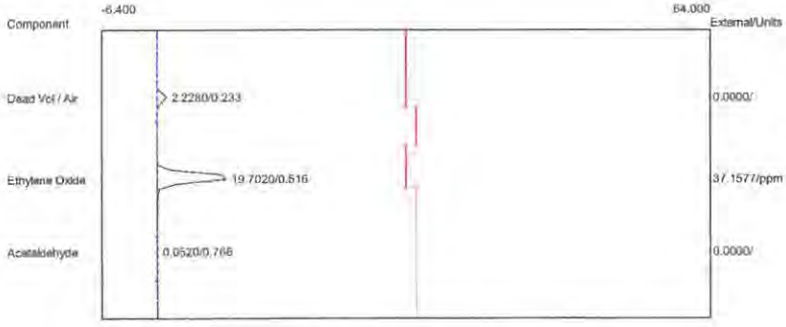
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:47:43
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A07.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2710	0.0000	
Ambient H2O	0.333	0.0505	0.0000	
Ethylene Oxide	0.500	20.2295	38.1526	ppm
Acetaldehyde	0.800	0.0690	0.0000	
		22.6200	38.1526	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:47:43
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A07.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	178.4380	0.0000	
		178.4380	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:52:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A08.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2280	0.0000	
Ethylene Oxide	0.516	19.7020	37.1577	ppm
Acetaldehyde	0.766	0.0520	0.0000	
		21.9820	37.1577	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:52:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A08.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.016	41.2730	0.0000	
Ambient H2O	0.350	197.4460	0.0000	
		238.7190	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:57:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A09.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2745	0.0000	
Ethylene Oxide	0.500	18.6440	35.1623	ppm
		20.9185	35.1623	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 09:57:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A09.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	191.9140	0.0000	
		191.9140	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 10:02:16
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A10.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2650	0.0000	
Ethylene Oxide	0.483	18.7495	35.3613	ppm
Acetaldehyde	0.850	0.0920	0.0000	
		21.1065	35.3613	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 10:02:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A10.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.316	212.4920	0.0000	
		212.4920	0.0000	

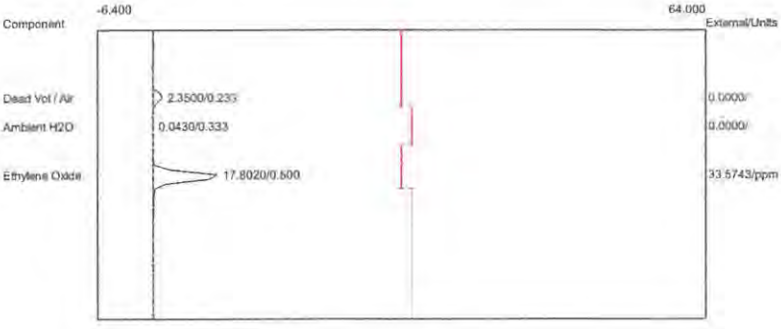
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 10:07:28
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A11.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2830	0.0000	
Ethylene Oxide	0.500	15.8650	29.9212	ppm
Acetaldehyde	0.766	0.0895	0.0000	
		18.2375	29.9212	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 10:07:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A11.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

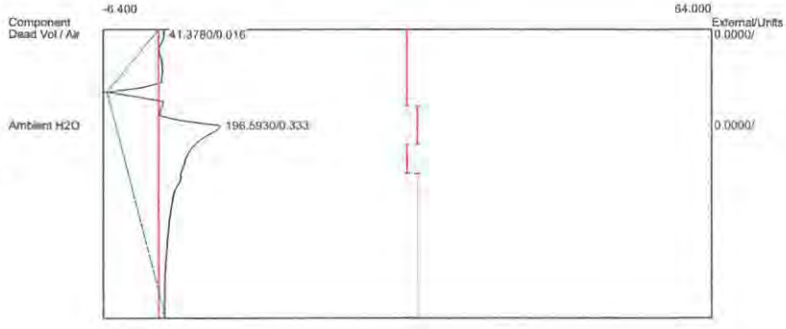
Component	Retention	Area	External	Units
Ambient H2O	0.333	189.4670	0.0000	
		189.4670	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 10:12:24
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-1A12.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



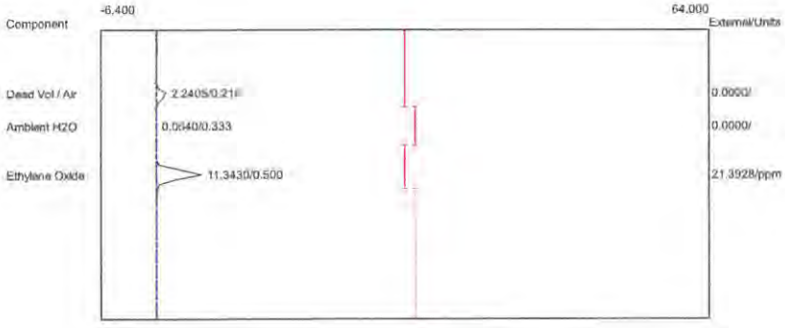
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3500	0.0000	
Ambient H2O	0.333	0.0430	0.0000	
Ethylene Oxide	0.500	17.8020	33.5743	ppm
		20.1950	33.5743	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1Aer
Analysis date: 02/06/2020 10:12:24
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-1A12.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



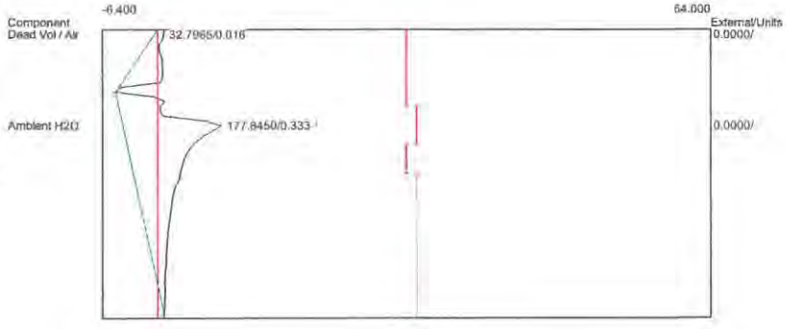
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	41.3780	0.0000	
Ambient H2O	0.333	196.5930	0.0000	
		237.9710	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 11:12:25
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A12.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2405	0.0000	
Ambient H2O	0.333	0.0640	0.0000	
Ethylene Oxide	0.500	11.3430	21.3928	ppm
		13.6475	21.3928	

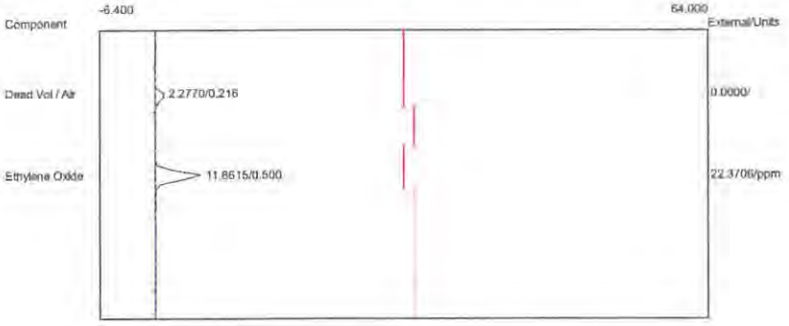
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 11:12:25
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A12.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	32.7965	0.0000	
Ambient H2O	0.333	177.8450	0.0000	
		210.6415	0.0000	

ARV Test #2 (Header B)
2/6/20 @ 10:15 - 11:10

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 11:05:33
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A11.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2770	0.0000	
Ethylene Oxide	0.500	11.8615	22.3706	ppm
		14.1385	22.3706	

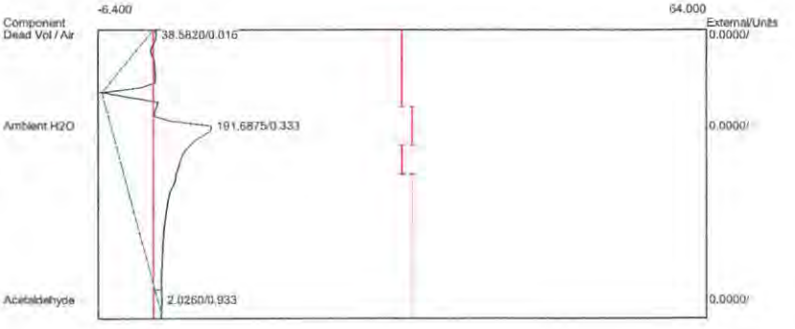
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 11:05:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A11.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	194.5190	0.0000	
		194.5190	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 11:02:09
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A10.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

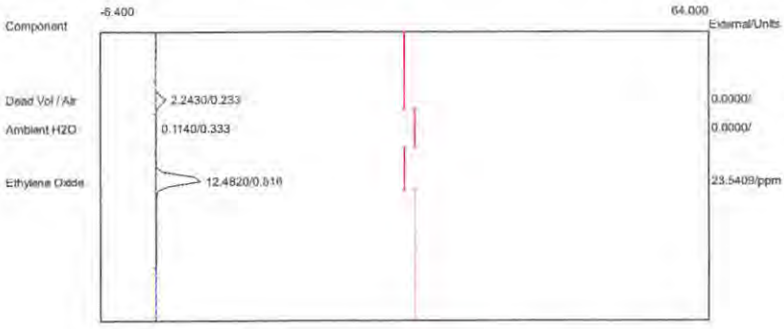
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1995	0.0000	
Ethylene Oxide	0.500	10.3400	19.5011	ppm
Acetaldehyde	0.766	0.0155	0.0000	
		12.5550	19.5011	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 11:02:09
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A10.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



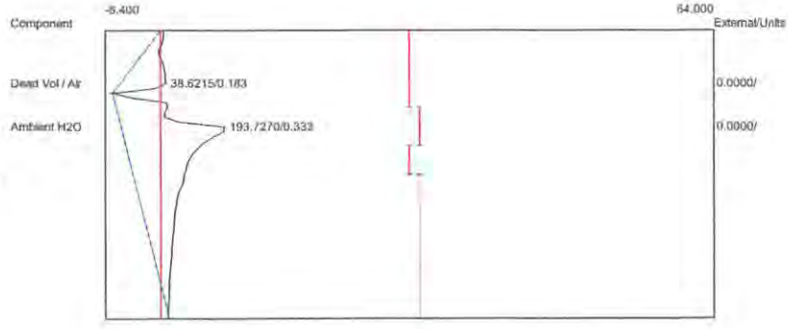
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	38.5820	0.0000	
Ambient H2O	0.333	191.6875	0.0000	
Acetaldehyde	0.933	2.0260	0.0000	
		232.2955	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:57:41
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A09.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2430	0.0000	
Ambient H2O	0.333	0.1140	0.0000	
Ethylene Oxide	0.516	12.4820	23.5409	ppm
		14.8390	23.5409	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:57:41
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A09.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.183	38.6215	0.0000	
Ambient H2O	0.333	193.7270	0.0000	
		232.3485	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:53:01
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A08.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3100	0.0000	
Ambient H2O	0.333	0.0285	0.0000	
Ethylene Oxide	0.500	11.1185	20.9693	ppm
Acetaldehyde	0.783	0.1300	0.0000	
		13.5870	20.9693	

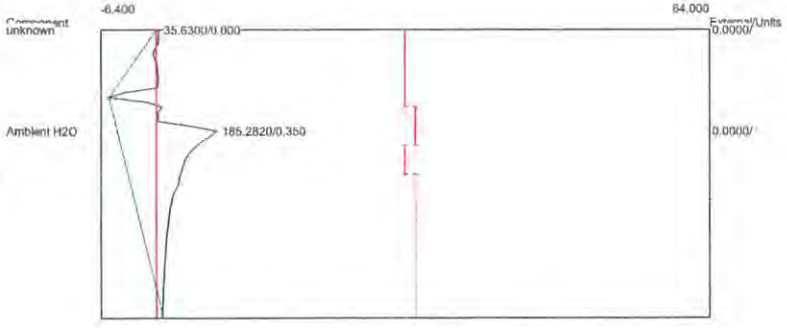
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:53:01
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A08.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	195.9950	0.0000	
		195.9950	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:47:51
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A07.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

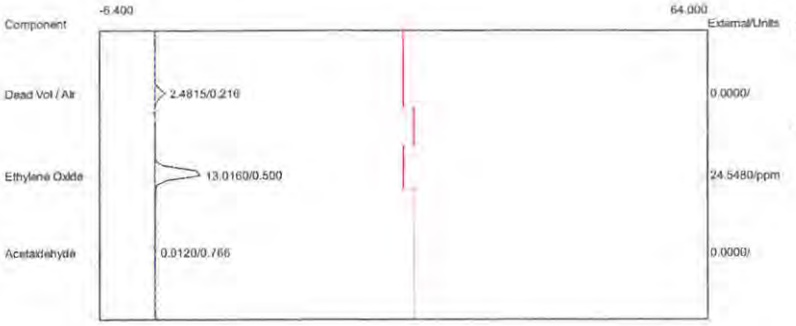
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2700	0.0000	
Ethylene Oxide	0.516	12.0470	22.7205	ppm
		14.3170	22.7205	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:47:51
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A07.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	185.2820	0.0000	
		185.2820	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:42:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A06.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

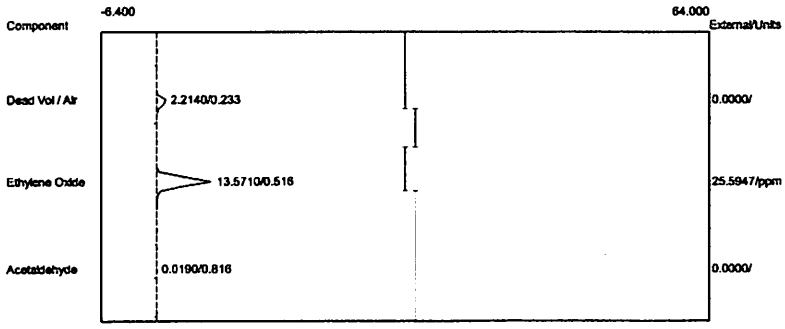


Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.4815	0.0000	
Ethylene Oxide	0.500	13.0160	24.5480	ppm
Acetaldehyde	0.766	0.0120	0.0000	
		15.5095	24.5480	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:42:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A06.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

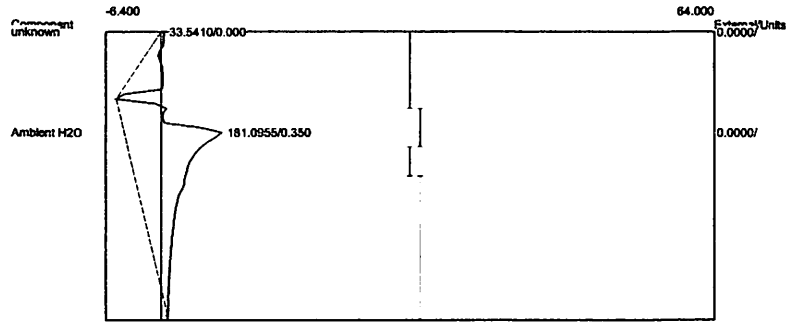
Component	Retention	Area	External	Units
Ambient H2O	0.333	197.5255	0.0000	
		197.5255	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:37:10
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A05.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2140	0.0000	
Ethylene Oxide	0.516	13.5710	25.5947	ppm
Acetaldehyde	0.816	0.0190	0.0000	
		15.8040	25.5947	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:37:10
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A05.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

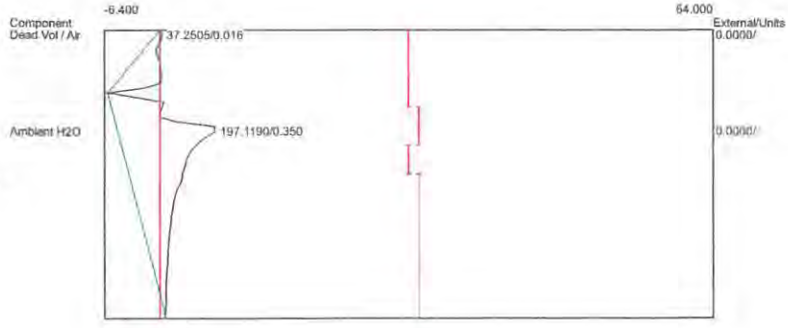


Component	Retention	Area	External	Units
Ambient H2O	0.350	181.0955	0.0000	
		181.0955	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:32:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A04.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

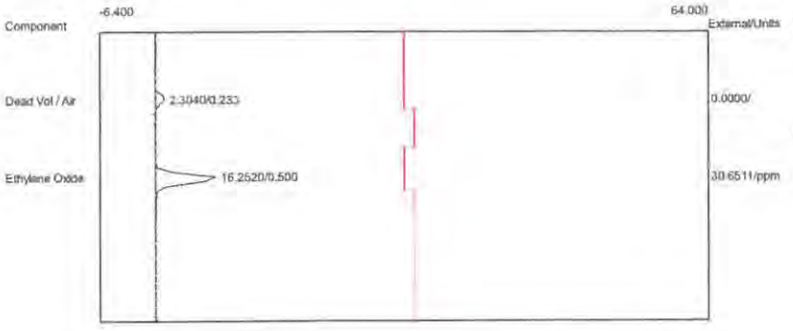
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2210	0.0000	
Ethylene Oxide	0.500	14.7415	27.8023	ppm
		16.9625	27.8023	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:32:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A04.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



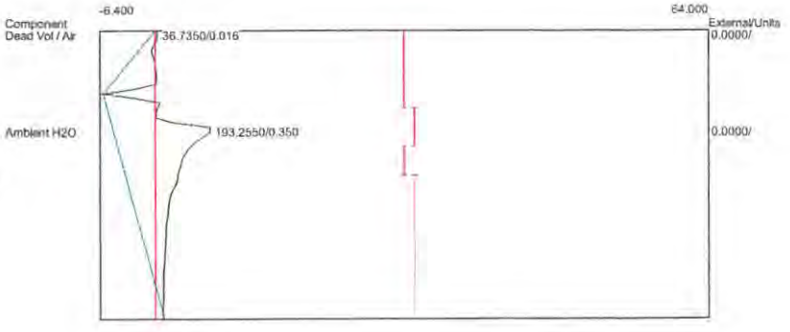
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	37.2505	0.0000	
Ambient H2O	0.350	197.1190	0.0000	
		234.3695	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:27:56
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A03.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



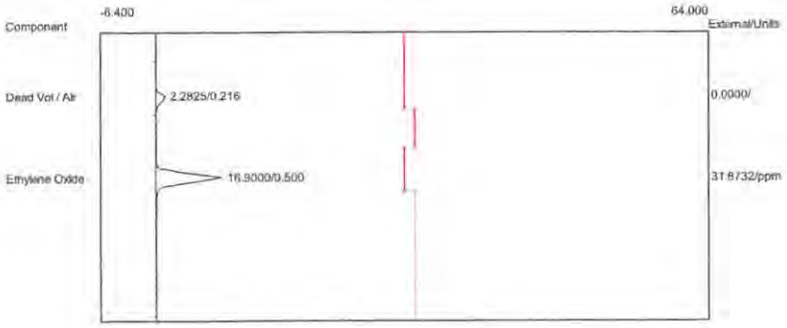
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3040	0.0000	
Ethylene Oxide	0.500	16.2520	30.6511	ppm
		18.5560	30.6511	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:27:56
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A03.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	36.7350	0.0000	
Ambient H2O	0.350	193.2550	0.0000	
		229.9900	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:22:20
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A02.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2825	0.0000	
Ethylene Oxide	0.500	16.9000	31.8732	ppm
		19.1825	31.8732	

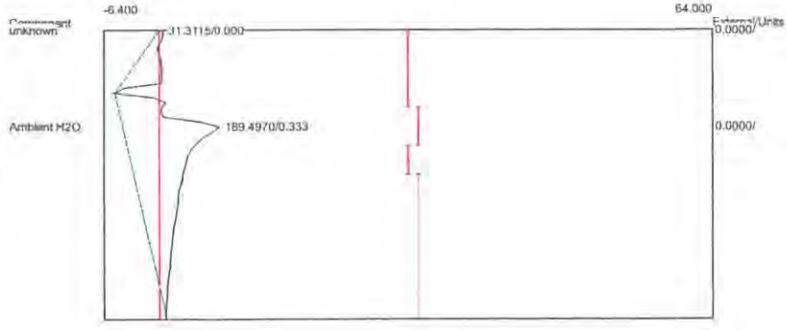
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:22:20
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A02.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	190.2020	0.0000	
		190.2020	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:17:34
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2A01.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2580	0.0000	
Ethylene Oxide	0.500	16.0135	30.2013	ppm
Acetaldehyde	0.766	0.1315	0.0000	
		18.4030	30.2013	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2Aer
Analysis date: 02/06/2020 10:17:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2A01.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.333	189.4970	0.0000	
		189.4970	0.0000	

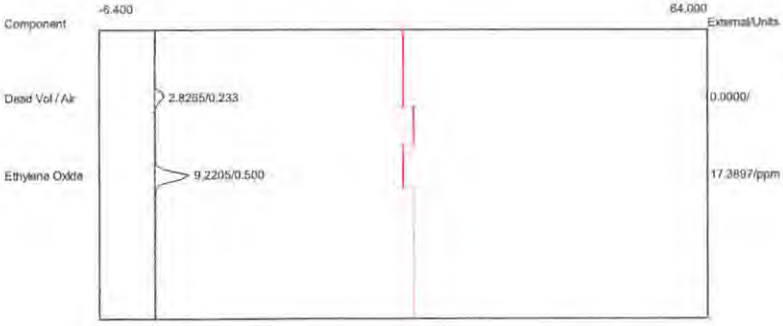
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 12:12:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A12.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1870	0.0000	
Ambient H2O	0.333	0.0510	0.0000	
Ethylene Oxide	0.500	8.5390	16.1044	ppm
Acetaldehyde	0.933	0.0295	0.0000	
		10.8065	16.1044	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 12:12:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A12.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.016	40.4085	0.0000	
Ambient H2O	0.333	202.8200	0.0000	
		243.2285	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 12:07:49
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A11.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

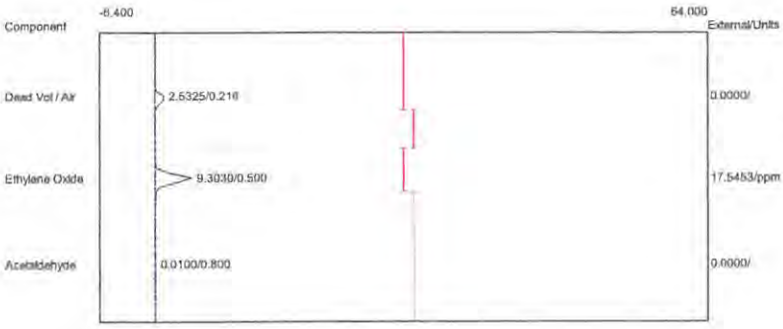


Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.8265	0.0000	
Ethylene Oxide	0.500	9.2205	17.3897	ppm
		12.0470	17.3897	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 12:07:49
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A11.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.133	41.3485	0.0000	
Ambient H2O	0.333	194.1160	0.0000	
		235.4645	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 12:02:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A10.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.5325	0.0000	
Ethylene Oxide	0.500	9.3030	17.5453	ppm
Acetaldehyde	0.800	0.0100	0.0000	
		11.8455	17.5453	

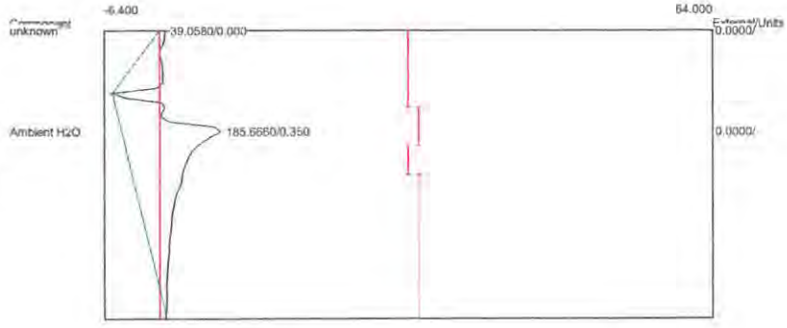
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 12:02:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A10.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.133	38.1365	0.0000	
Ambient H2O	0.333	191.1250	0.0000	
		229.2615	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:57:42
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A09.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.6715	0.0000	
Ethylene Oxide	0.516	9.9140	18.6977	ppm
Acetaldehyde	0.750	0.0140	0.0000	
		12.5995	18.6977	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:57:42
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A09.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	185.6660	0.0000	
		185.6660	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:52:40
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A08.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3145	0.0000	
Ethylene Oxide	0.500	9.6610	18.2205	ppm
Acetaldehyde	0.750	0.1310	0.0000	
		12.1065	18.2205	

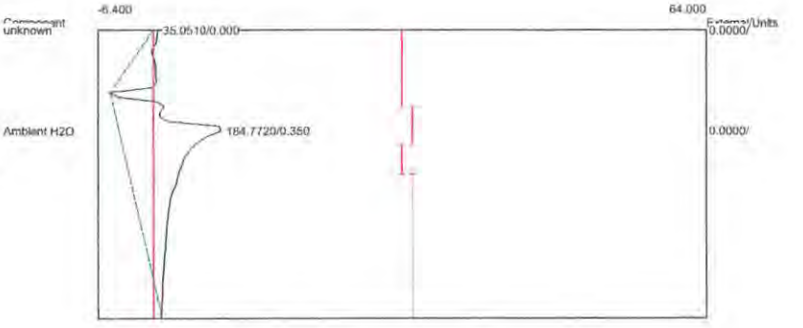
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:52:40
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A08.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.016	39.6145	0.0000	
Ambient H2O	0.333	200.1700	0.0000	
		239.7845	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:47:27
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A07.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

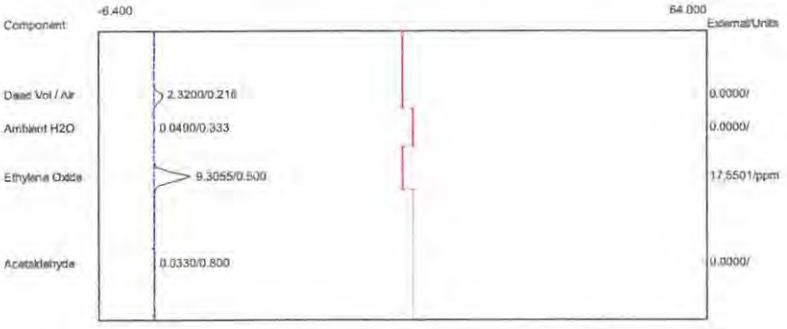
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3050	0.0000	
Ethylene Oxide	0.516	10.1970	19.2314	ppm
		12.5020	19.2314	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:47:27
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A07.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



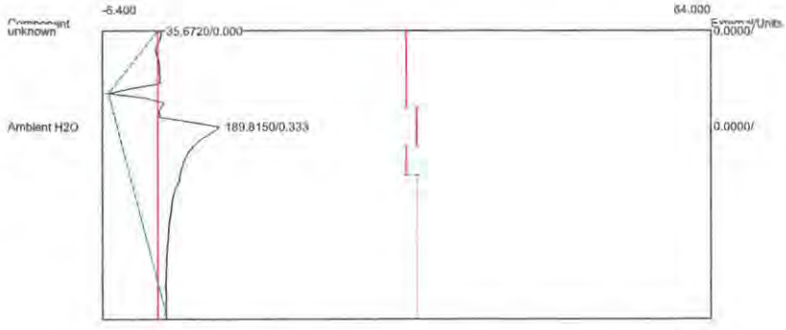
Component	Retention	Area	External	Units
Ambient H2O	0.350	184.7720	0.0000	
		184.7720	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:42:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A06.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3200	0.0000	
Ambient H2O	0.333	0.0490	0.0000	
Ethylene Oxide	0.500	9.3055	17.5501	ppm
Acetaldehyde	0.800	0.0330	0.0000	
		11.7075	17.5501	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:42:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A06.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

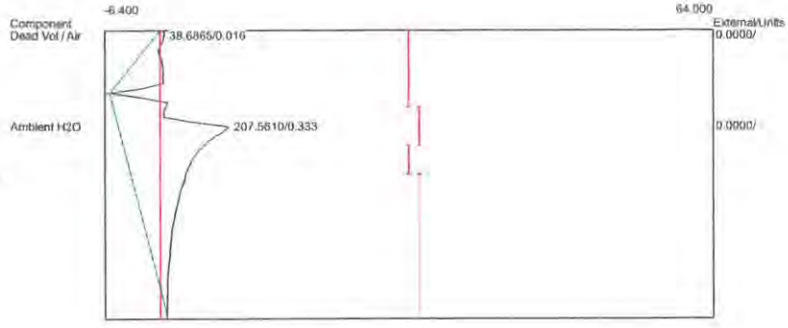


Component	Retention	Area	External	Units
Ambient H2O	0.333	189.8150	0.0000	
		189.8150	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:37:43
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A05.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2335	0.0000	
Ethylene Oxide	0.500	9.8500	18.5770	ppm
Acetaldehyde	0.750	0.1010	0.0000	
		12.1845	18.5770	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:37:43
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A05.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	38.6865	0.0000	
Ambient H2O	0.333	207.5610	0.0000	
		246.2475	0.0000	

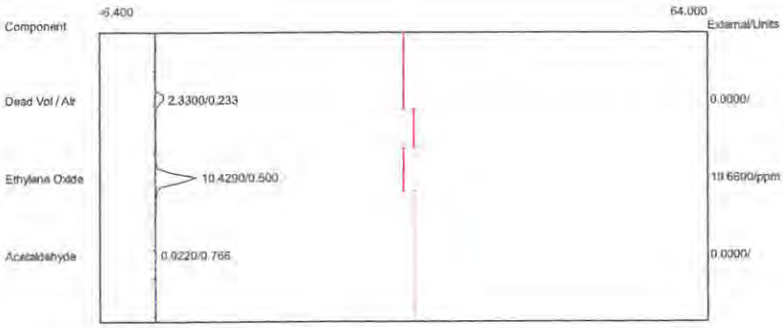
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:32:19
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A04.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.7040	0.0000	
Ethylene Oxide	0.483	10.2325	19.2984	ppm
Acetaldehyde	0.700	0.1560	0.0000	
		13.0925	19.2984	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:32:19
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A04.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

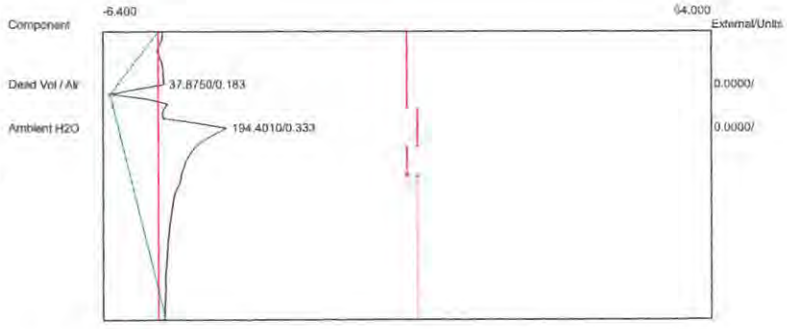
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	36.8290	0.0000	
Ambient H2O	0.316	209.8275	0.0000	
		246.6565	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:27:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A03.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3300	0.0000	
Ethylene Oxide	0.500	10.4290	19.6690	ppm
Acetaldehyde	0.766	0.0220	0.0000	
		12.7810	19.6690	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:27:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A03.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.183	37.8750	0.0000	
Ambient H2O	0.333	194.4010	0.0000	
		232.2760	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:22:26
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A02.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2910	0.0000	
Ethylene Oxide	0.500	11.2540	21.2249	ppm
		13.5450	21.2249	

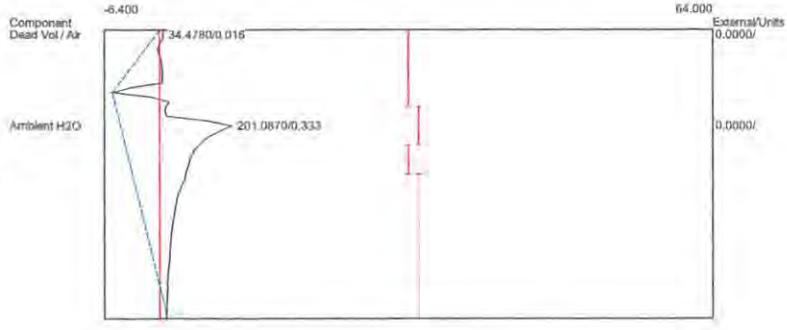
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:22:26
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A02.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	201.0890	0.0000	
		201.0890	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:17:54
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3A01.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3040	0.0000	
Ethylene Oxide	0.500	11.5550	21.7926	ppm
		13.8590	21.7926	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3Aer
Analysis date: 02/06/2020 11:17:54
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3A01.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

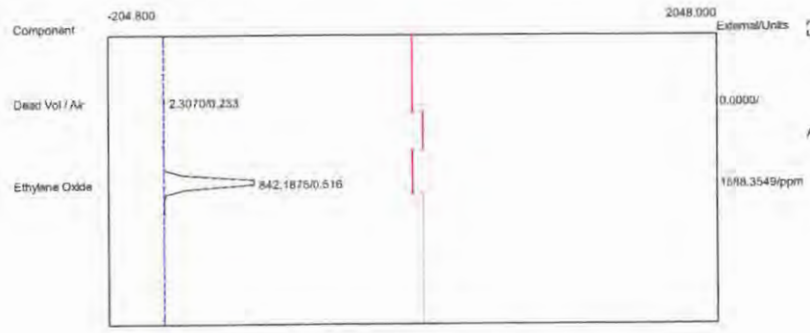


Component	Retention	Area	External	Units
Dead Vol / Air	0.016	34.4780	0.0000	
Ambient H2O	0.333	201.0870	0.0000	
		235.5650	0.0000	

Back Vent Test #1

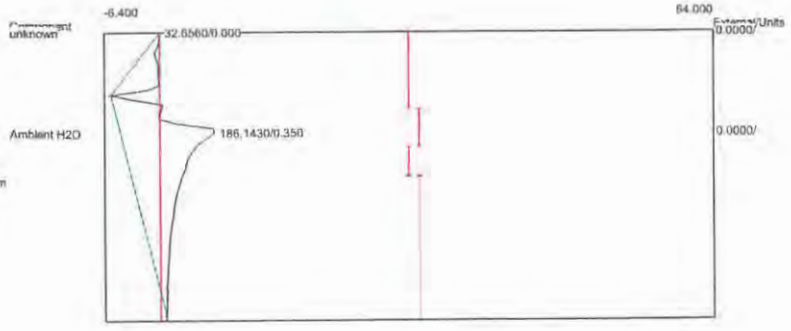
Chamber 1

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:04:29
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B01.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3070	0.0000	
Ethylene Oxide	0.516	842.1875	1588.3549	ppm
		844.4945	1588.3549	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:04:29
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B01.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



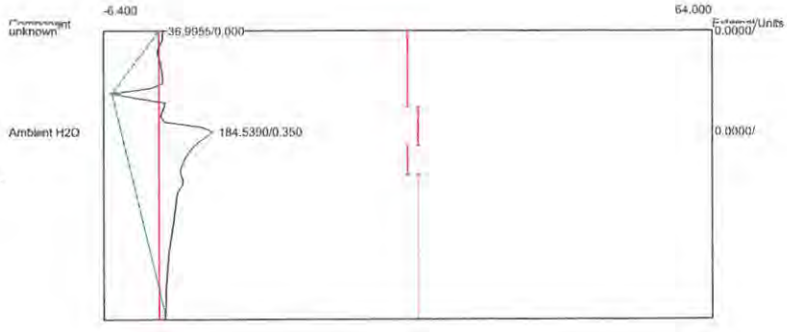
Component	Retention	Area	External	Units
Ambient H2O	0.350	186.1430	0.0000	
		186.1430	0.0000	

BV Test #1
Sterilizer chamber St

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:05:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B02.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

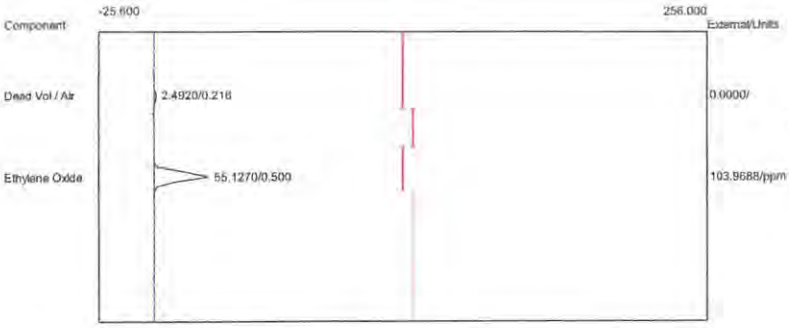
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.4820	0.0000	
Ambient H2O	0.333	0.0800	0.0000	
Ethylene Oxide	0.516	80.8010	152.3897	ppm
Acetaldehyde	0.800	0.1500	0.0000	
		83.5130	152.3897	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:05:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B02.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	184.5390	0.0000	
		184.5390	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:06:48
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B03.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

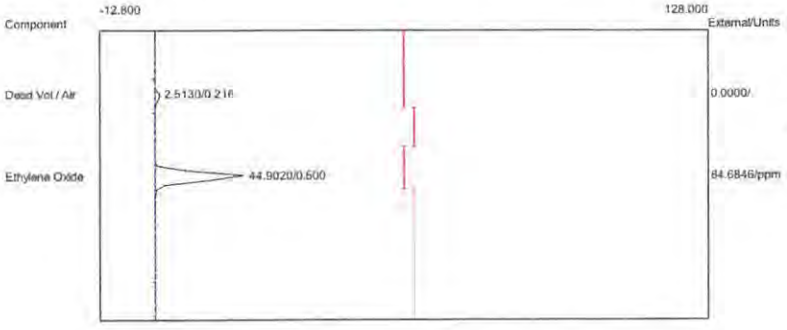


Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.4920	0.0000	
Ethylene Oxide	0.500	55.1270	103.9688	ppm
		57.6190	103.9688	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:06:48
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B03.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	167.1345	0.0000	
		167.1345	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:07:54
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B04.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.5130	0.0000	
Ethylene Oxide	0.500	44.9020	84.6846	ppm
		47.4150	84.6846	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:07:54
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B04.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	183.2400	0.0000	
		183.2400	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:08:58
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B05.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.4350	0.0000	
Ethylene Oxide	0.516	36.8400	69.4798	ppm
Acetaldehyde	0.833	0.0150	0.0000	
		39.2900	69.4798	

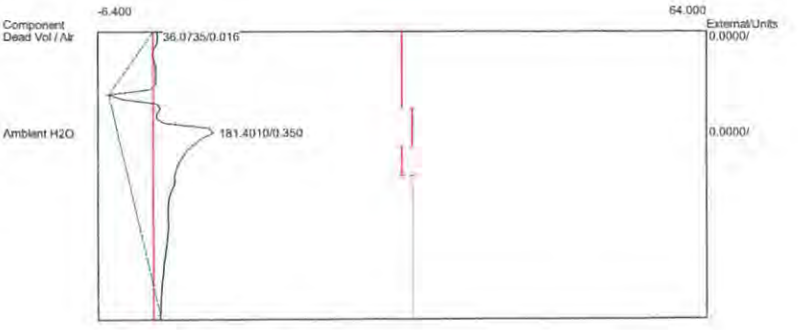
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:08:58
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B05.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.350	188.6700	0.0000	
		188.6700	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:10:09
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B06.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

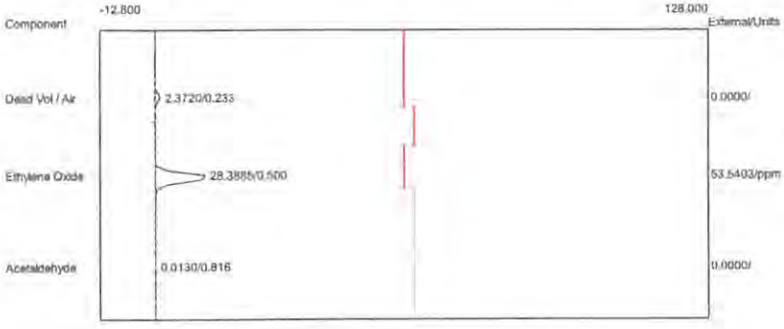
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3870	0.0000	
Ethylene Oxide	0.516	32.5100	61.3134	ppm
Acetaldehyde	0.816	0.0610	0.0000	
		34.9580	61.3134	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:10:09
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B06.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



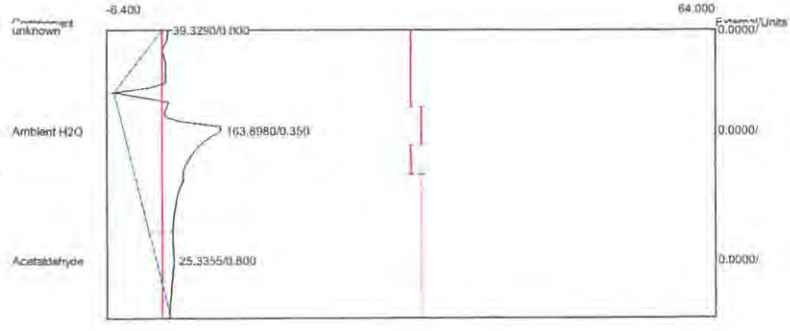
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	36.0735	0.0000	
Ambient H2O	0.350	181.4010	0.0000	
		217.4745	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:11:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B07.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



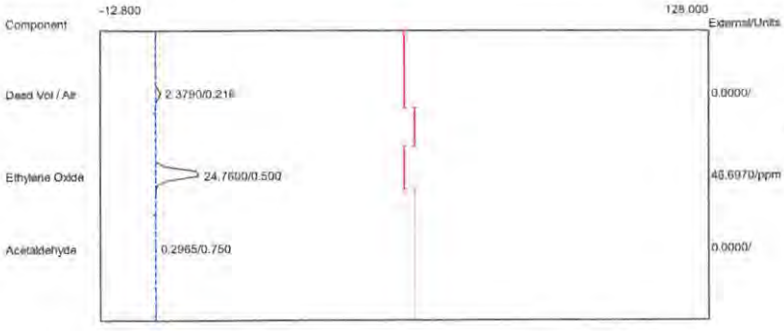
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3720	0.0000	
Ethylene Oxide	0.500	28.3885	53.5403	ppm
Acetaldehyde	0.816	0.0130	0.0000	
		30.7735	53.5403	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:11:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B07.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	163.8980	0.0000	
Acetaldehyde	0.800	25.3355	0.0000	
		189.2335	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:12:31
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B08.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

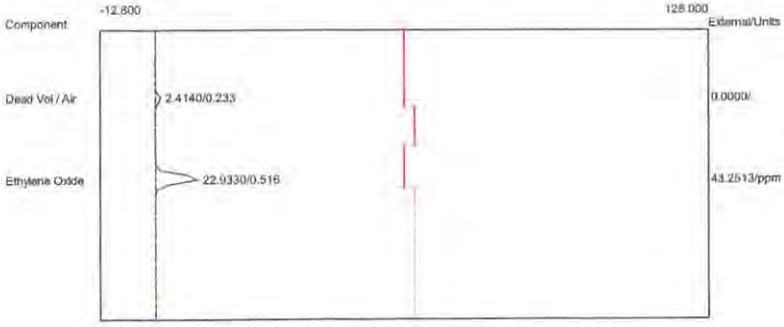


Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3790	0.0000	
Ethylene Oxide	0.500	24.7600	46.6970	ppm
Acetaldehyde	0.750	0.2965	0.0000	
		27.4355	46.6970	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:12:31
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B08.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.333	192.1395	0.0000	
		192.1395	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:13:53
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B09.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

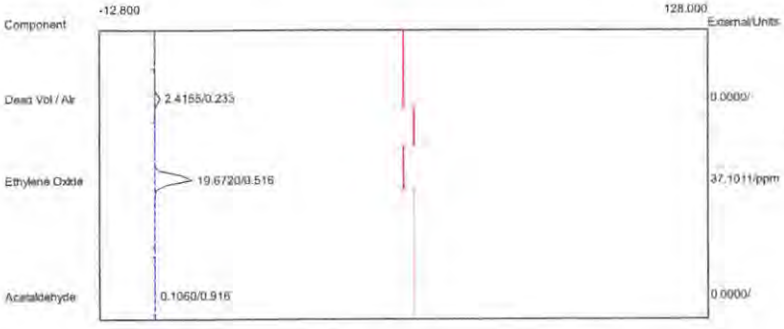


Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.4140	0.0000	
Ethylene Oxide	0.516	22.9330	43.2513	ppm
		25.3470	43.2513	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:13:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B09.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

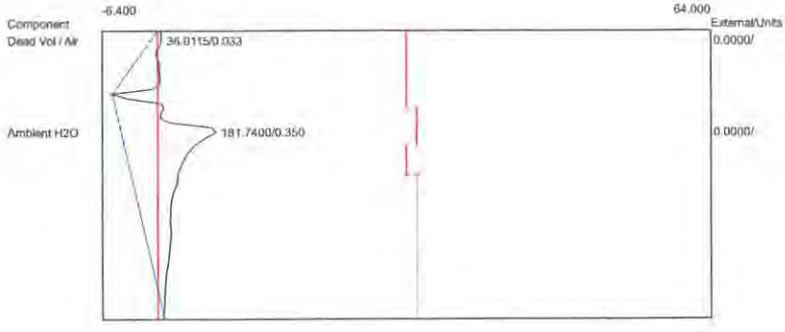
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	35.4365	0.0000	
Ambient H2O	0.350	181.1910	0.0000	
		216.6275	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:15:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B10.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



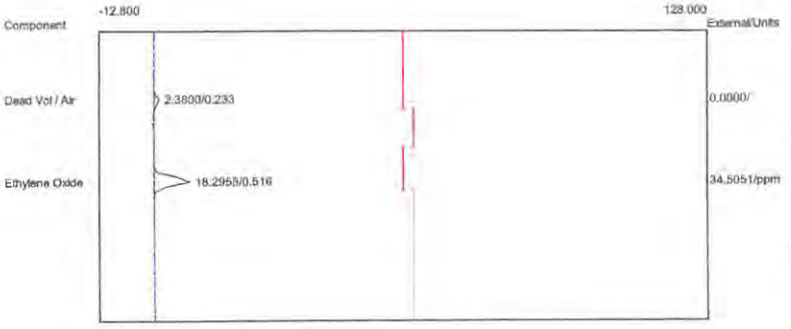
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.4155	0.0000	
Ethylene Oxide	0.516	19.6720	37.1011	ppm
Acetaldehyde	0.916	0.1060	0.0000	
		22.1935	37.1011	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:15:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B10.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.033	36.0115	0.0000	
Ambient H2O	0.350	181.7400	0.0000	
		217.7515	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:16:08
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B11.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

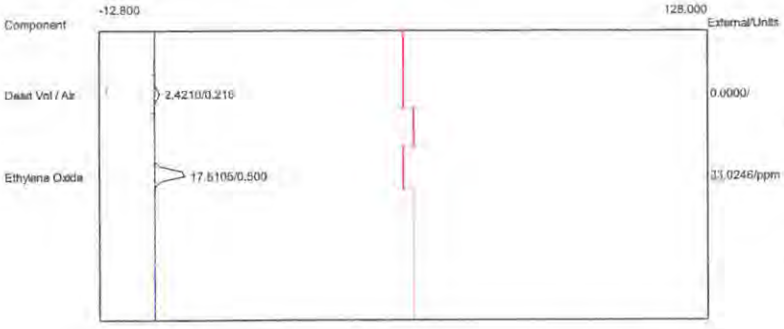


Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3800	0.0000	
Ethylene Oxide	0.516	18.2955	34.5051	ppm
		20.6755	34.5051	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:16:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B11.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Ambient H2O	0.350	150.0030	0.0000	
Acetaldehyde	0.783	20.6040	0.0000	
		170.6070	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:17:12
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-B12.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.4210	0.0000	
Ethylene Oxide	0.500	17.5105	33.0246	ppm
		19.9315	33.0246	

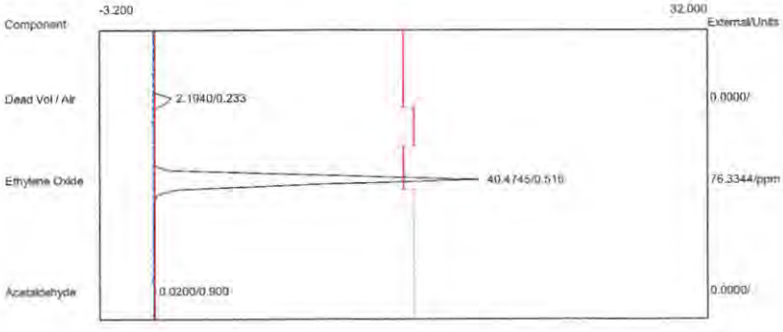
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#1BV
Analysis date: 02/06/2020 16:17:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-B12.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.016	35.0790	0.0000	
Ambient H2O	0.333	162.9260	0.0000	
Acetaldehyde	0.800	24.3805	0.0000	
		222.3855	0.0000	

Back Vent Test #2

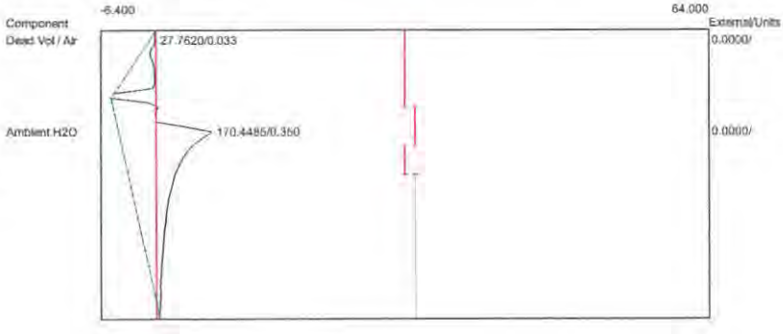
Chamber 3 - Empty

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:25:00
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B01.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



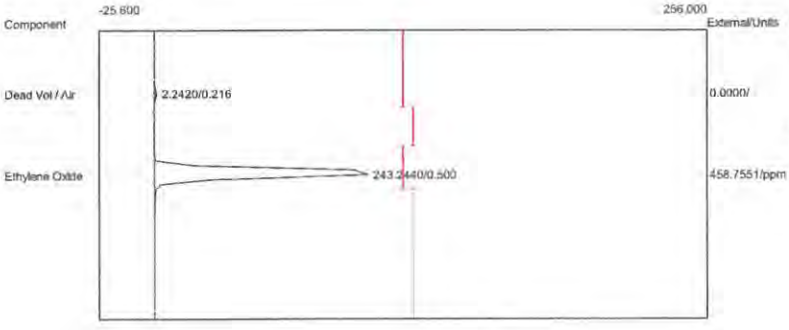
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1940	0.0000	
Ethylene Oxide	0.516	40.4745	76.3344	ppm
Acetaldehyde	0.900	0.0200	0.0000	
		42.6885	76.3344	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:25:00
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B01.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



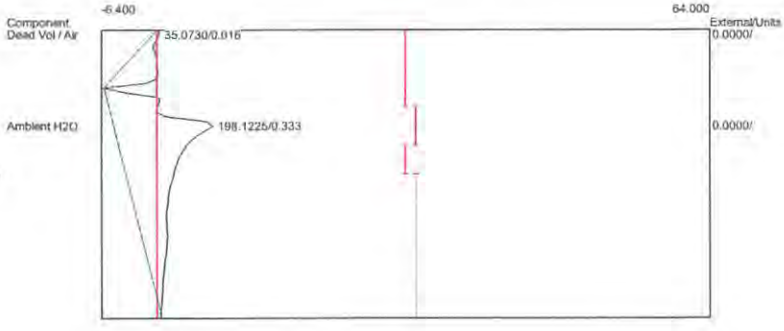
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	27.7620	0.0000	
Ambient H2O	0.350	170.4485	0.0000	
		198.2105	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:26:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B02.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



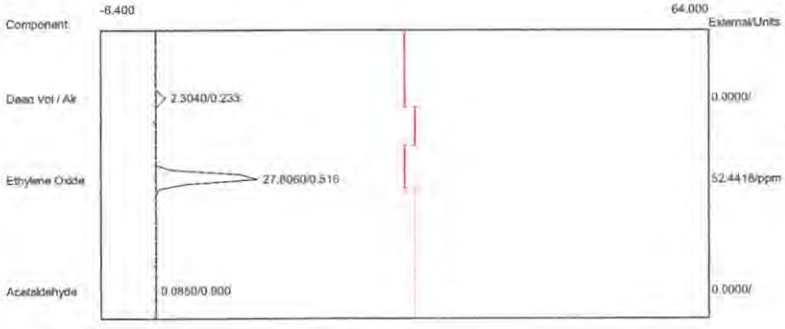
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2420	0.0000	
Ethylene Oxide	0.500	243.2440	458.7551	ppm
		245.4860	458.7551	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:26:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B02.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



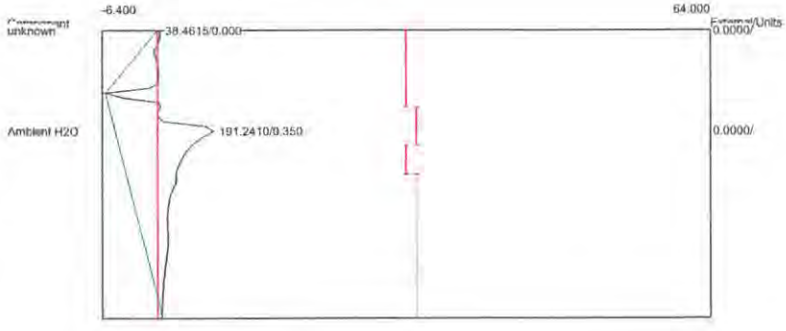
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	35.0730	0.0000	
Ambient H2O	0.333	198.1225	0.0000	
		233.1955	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:27:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B03.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



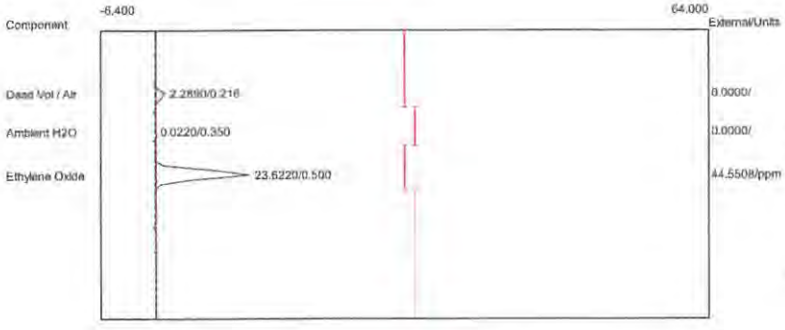
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3040	0.0000	
Ethylene Oxide	0.516	27.8060	52.4418	ppm
Acetaldehyde	0.900	0.0850	0.0000	
		30.1950	52.4418	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:27:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B03.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



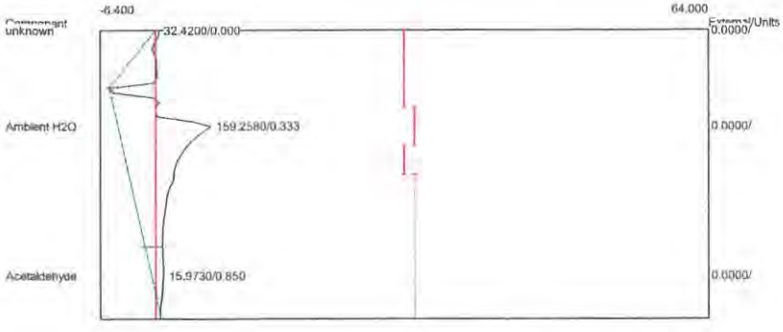
Component	Retention	Area	External	Units
Ambient H2O	0.350	191.2410	0.0000	
		191.2410	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:28:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B04.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2890	0.0000	
Ambient H2O	0.350	0.0220	0.0000	
Ethylene Oxide	0.500	23.6220	44.5508	ppm
		25.9330	44.5508	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:28:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B04.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.333	159.2580	0.0000	
Acetaldehyde	0.850	15.9730	0.0000	
		175.2310	0.0000	

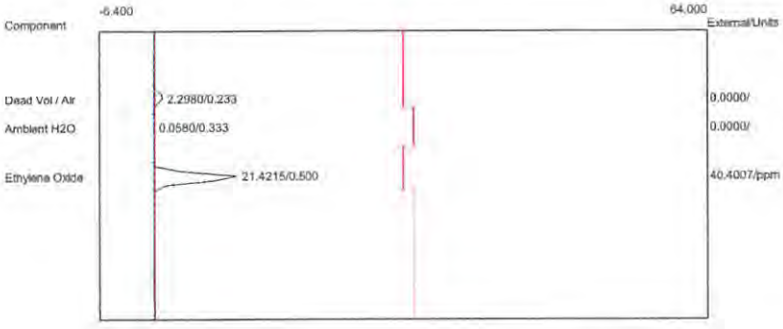
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:29:21
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B05.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3290	0.0000	
Ethylene Oxide	0.500	21.3900	40.3413	ppm
Acetaldehyde	0.850	0.0160	0.0000	
		23.7350	40.3413	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:29:21
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B05.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

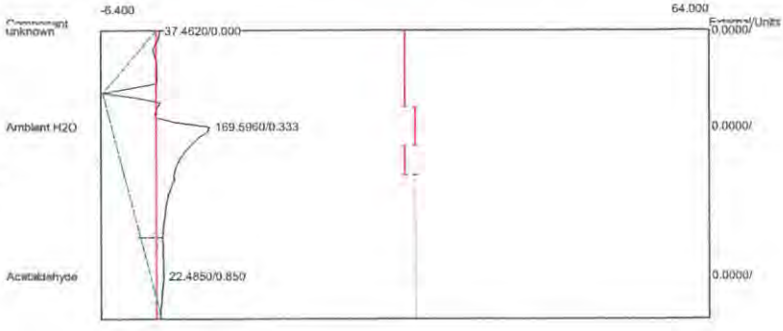
Component	Retention	Area	External	Units
Ambient H2O	0.333	165.7730	0.0000	
Acetaldehyde	0.800	25.4850	0.0000	
		191.2580	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:30:24
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B06.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



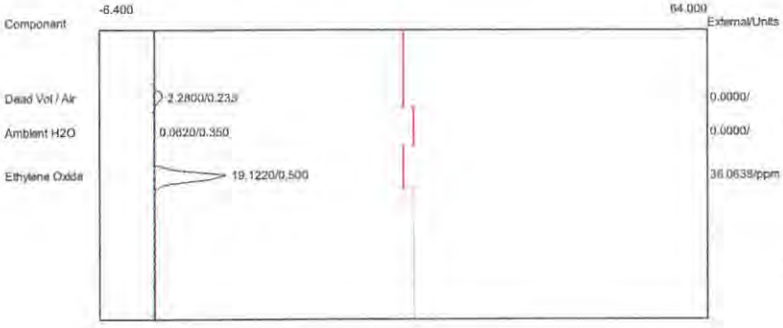
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2980	0.0000	
Ambient H2O	0.333	0.0580	0.0000	
Ethylene Oxide	0.500	21.4215	40.4007	ppm
		23.7775	40.4007	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:30:24
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B06.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.333	169.5960	0.0000	
Acetaldehyde	0.850	22.4850	0.0000	
		192.0810	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:31:27
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B07.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

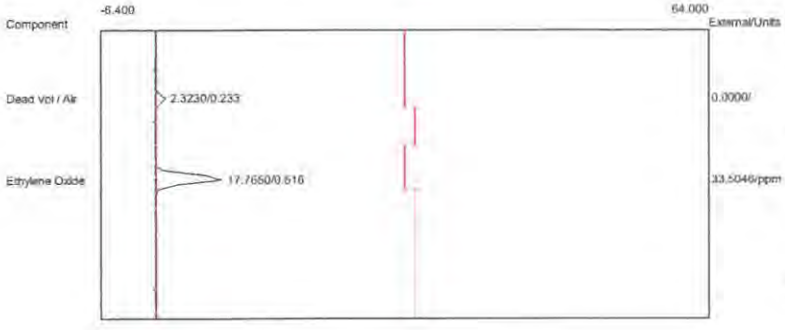


Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2800	0.0000	
Ambient H2O	0.350	0.0620	0.0000	
Ethylene Oxide	0.500	19.1220	36.0638	ppm
		21.4640	36.0638	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:31:27
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B07.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

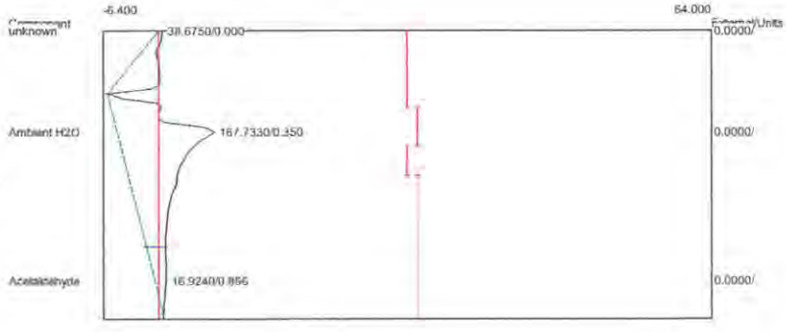
Component	Retention	Area	External	Units
Ambient H2O	0.333	174.4850	0.0000	
Acetaldehyde	0.816	20.4580	0.0000	
		194.9430	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:32:29
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B08.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3230	0.0000	
Ethylene Oxide	0.516	17.7650	33.5046	ppm
		20.0880	33.5046	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:32:29
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B08.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	167.7330	0.0000	
Acetaldehyde	0.866	16.9240	0.0000	
		184.6570	0.0000	

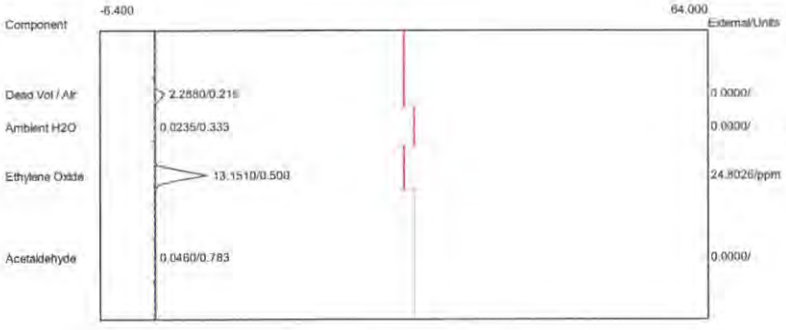
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:33:47
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B09.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3140	0.0000	
Ambient H2O	0.333	0.0280	0.0000	
Ethylene Oxide	0.500	16.2150	30.5813	ppm
Acetaldehyde	0.750	0.0890	0.0000	
		18.6460	30.5813	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:33:47
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B09.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

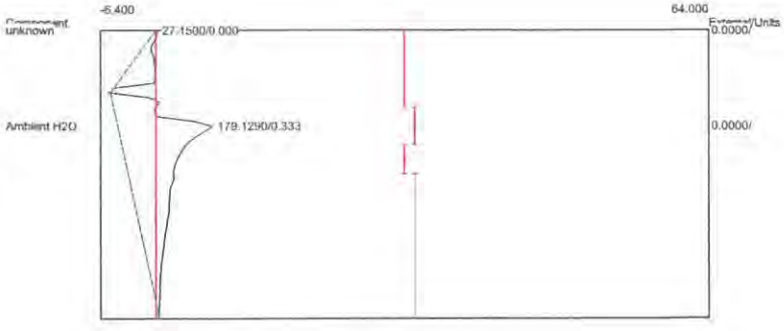
Component	Retention	Area	External	Units
Ambient H2O	0.333	196.3825	0.0000	
		196.3825	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:35:02
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B10.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2880	0.0000	
Ambient H2O	0.333	0.0235	0.0000	
Ethylene Oxide	0.500	13.1510	24.8026	ppm
Acetaldehyde	0.783	0.0460	0.0000	
		15.5085	24.8026	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:35:02
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B10.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

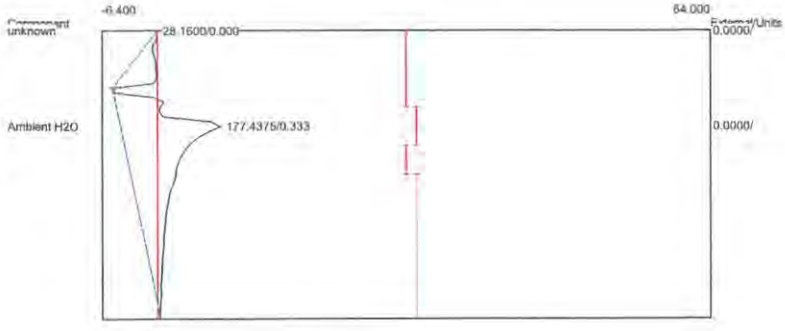


Component	Retention	Area	External	Units
Ambient H2O	0.333	179.1290	0.0000	
		179.1290	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:36:37
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B11.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

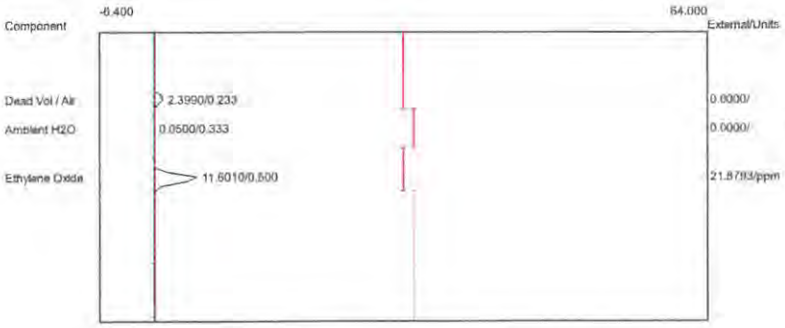
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2955	0.0000	
Ethylene Oxide	0.500	11.9080	22.4583	ppm
Acetaldehyde	0.666	0.0165	0.0000	
		14.2200	22.4583	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:36:37
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B11.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



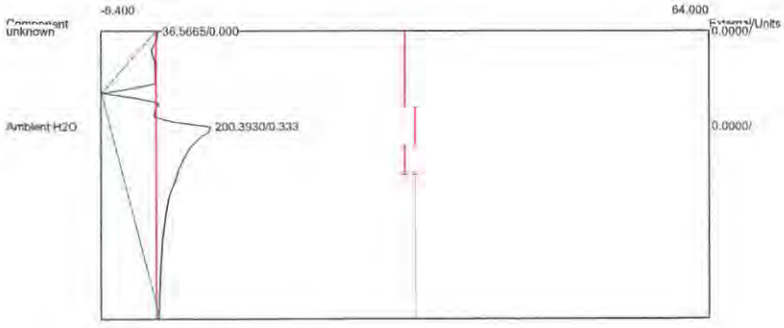
Component	Retention	Area	External	Units
Ambient H2O	0.333	177.4375	0.0000	
		177.4375	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:38:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-2B12.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3990	0.0000	
Ambient H2O	0.333	0.0500	0.0000	
Ethylene Oxide	0.500	11.6010	21.8793	ppm
		14.0500	21.8793	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#2BV
Analysis date: 02/06/2020 16:38:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-2B12.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.333	200.3930	0.0000	
		200.3930	0.0000	

Back vent test 2
chamber 3, Empty
2-6-2020

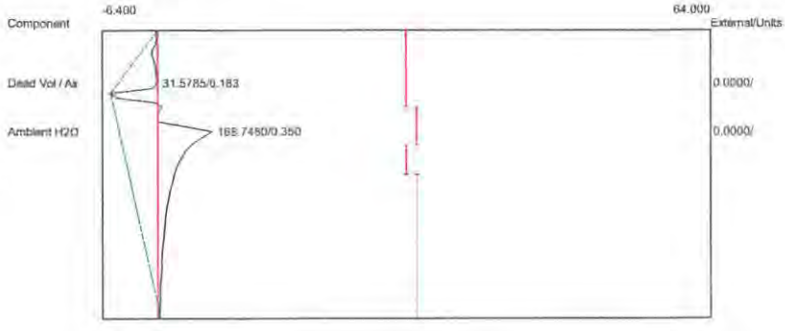
Back Vent Test #3

Chamber 7

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 17:00:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B12.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1600	0.0000	
Ethylene Oxide	0.516	30.1550	56.8719	ppm
		32.3150	56.8719	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 17:00:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B12.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



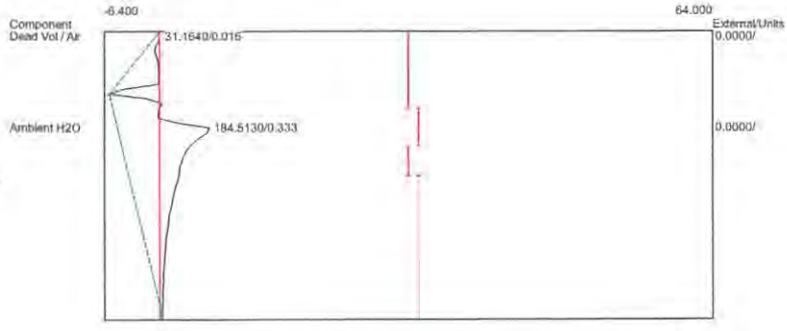
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	31.5785	0.0000	
Ambient H2O	0.350	168.7480	0.0000	
		200.3265	0.0000	

Back vent test 3
Chamber 7 -
2-6-2020

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:58:25
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B11.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2380	0.0000	
Ethylene Oxide	0.500	56.3090	106.1981	ppm
		58.5470	106.1981	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:58:25
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B11.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

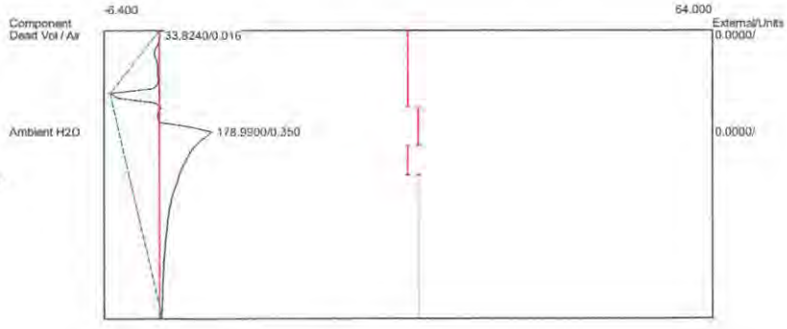


Component	Retention	Area	External	Units
Dead Vol / Air	0.016	31.1640	0.0000	
Ambient H2O	0.333	184.5130	0.0000	
		215.6770	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:57:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B10.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2625	0.0000	
Ambient H2O	0.350	0.0510	0.0000	
Ethylene Oxide	0.516	66.9680	126.3008	ppm
		69.2815	126.3008	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:57:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B10.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	33.8240	0.0000	
Ambient H2O	0.350	178.9900	0.0000	
		212.8140	0.0000	

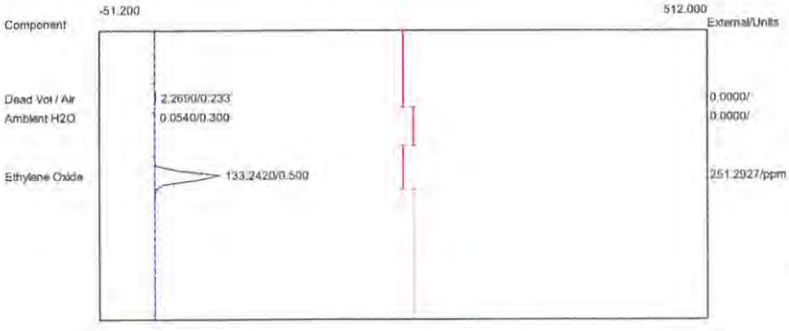
Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:55:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B09.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3145	0.0000	
Ambient H2O	0.333	0.0630	0.0000	
Ethylene Oxide	0.500	115.9400	218.6614	ppm
		118.3175	218.6614	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:55:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B09.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

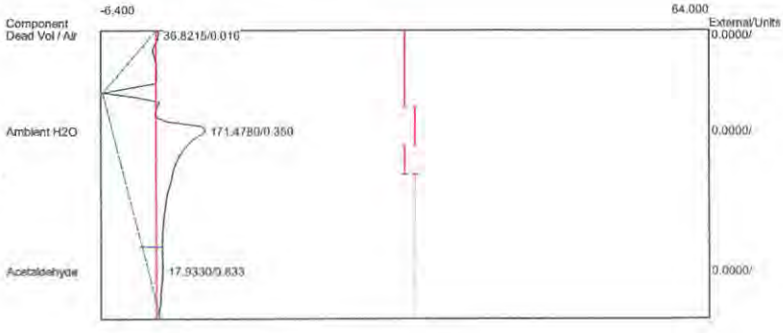
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	37.1995	0.0000	
Ambient H2O	0.350	196.2500	0.0000	
		233.4495	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:54:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B08.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



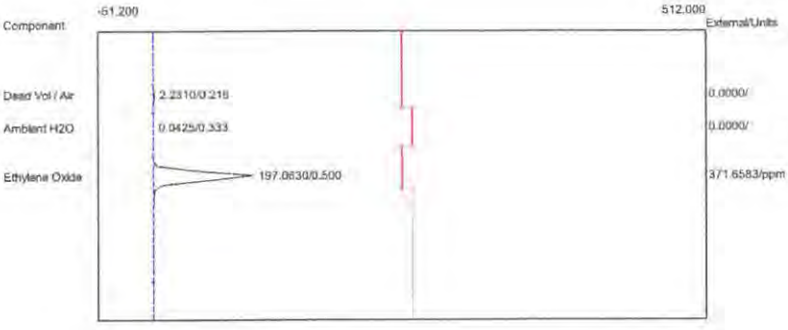
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2690	0.0000	
Ambient H2O	0.300	0.0540	0.0000	
Ethylene Oxide	0.500	133.2420	251.2927	ppm
		135.5650	251.2927	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:54:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B08.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



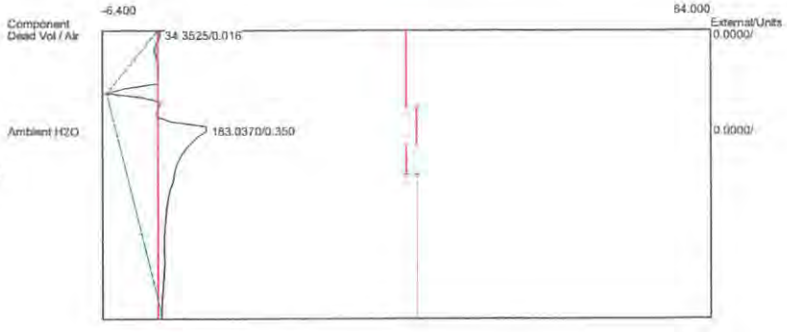
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	36.8215	0.0000	
Ambient H2O	0.350	171.4780	0.0000	
Acetaldehyde	0.833	17.9330	0.0000	
		226.2325	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:53:12
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B07.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



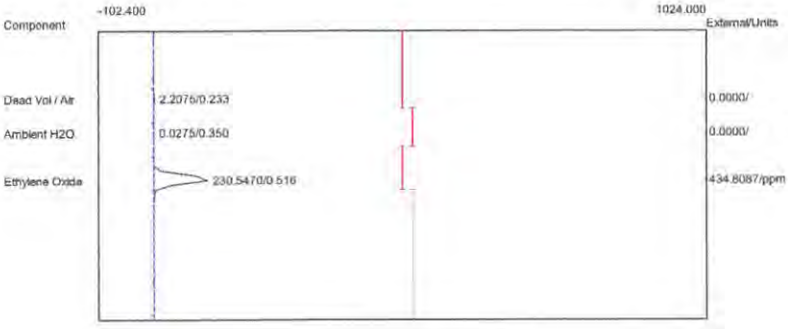
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2310	0.0000	
Ambient H2O	0.333	0.0425	0.0000	
Ethylene Oxide	0.500	197.0630	371.6583	ppm
		199.3365	371.6583	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:53:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B07.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



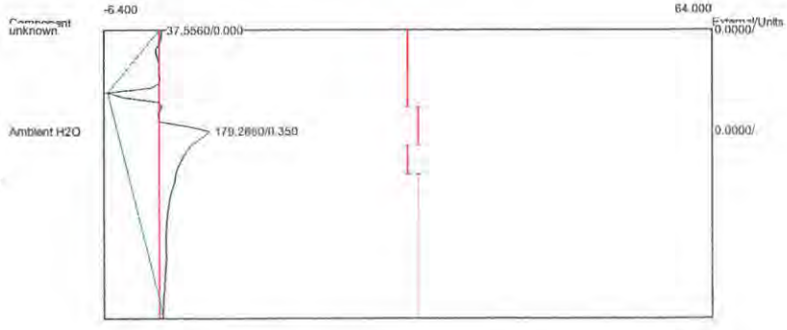
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	34.3525	0.0000	
Ambient H2O	0.350	183.0370	0.0000	
		217.3895	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:52:08
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B06.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2075	0.0000	
Ambient H2O	0.350	0.0275	0.0000	
Ethylene Oxide	0.516	230.5470	434.8087	ppm
		232.7820	434.8087	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:52:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B06.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

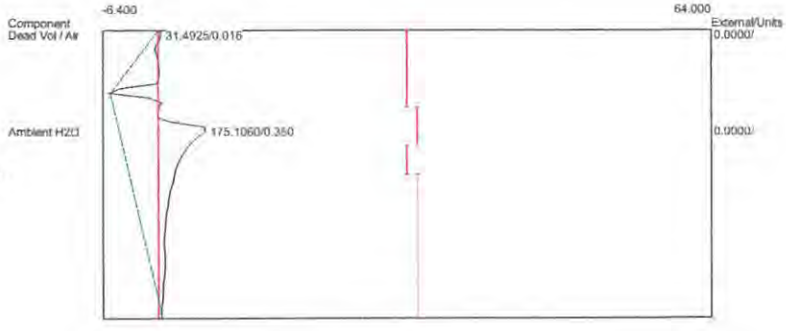


Component	Retention	Area	External	Units
Ambient H2O	0.350	179.2660	0.0000	
		179.2660	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:51:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B05.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2300	0.0000	
Ambient H2O	0.333	0.0610	0.0000	
Ethylene Oxide	0.500	302.9945	571.4438	ppm
		305.2855	571.4438	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:51:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B05.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

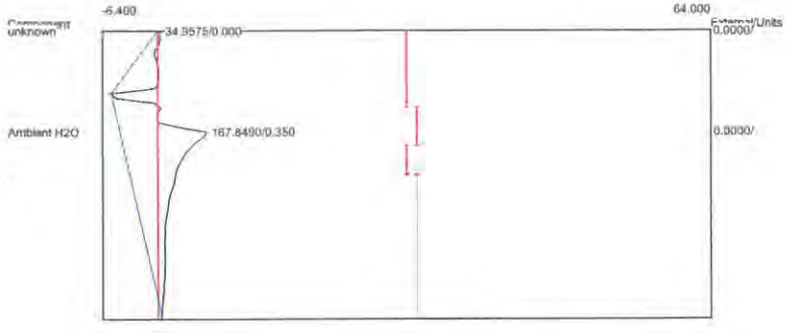


Component	Retention	Area	External	Units
Dead Vol / Air	0.016	31.4925	0.0000	
Ambient H2O	0.350	175.1060	0.0000	
		206.5985	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:50:00
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B04.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2410	0.0000	
Ambient H2O	0.350	0.0540	0.0000	
Ethylene Oxide	0.516	385.8810	727.7666	ppm
		388.1760	727.7666	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:50:00
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B04.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

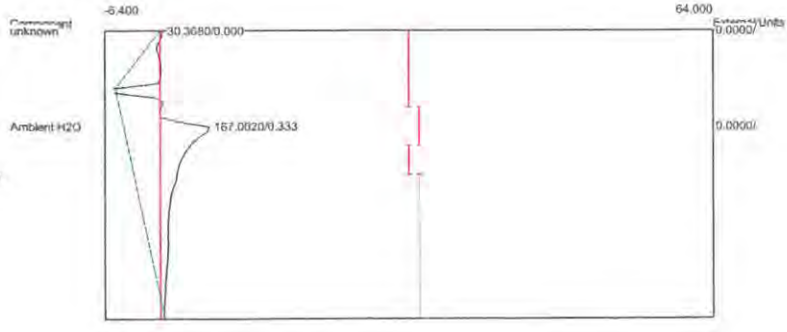


Component	Retention	Area	External	Units
Ambient H2O	0.350	167.8490	0.0000	
		167.8490	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:48:56
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B03.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2460	0.0000	
Ethylene Oxide	0.500	434.9165	820.2470	ppm
		437.1625	820.2470	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:48:56
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B03.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer

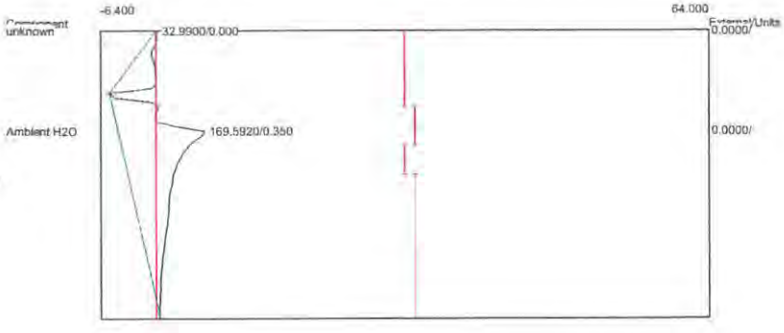


Component	Retention	Area	External	Units
Ambient H2O	0.333	167.0020	0.0000	
		167.0020	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:47:50
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B02.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer

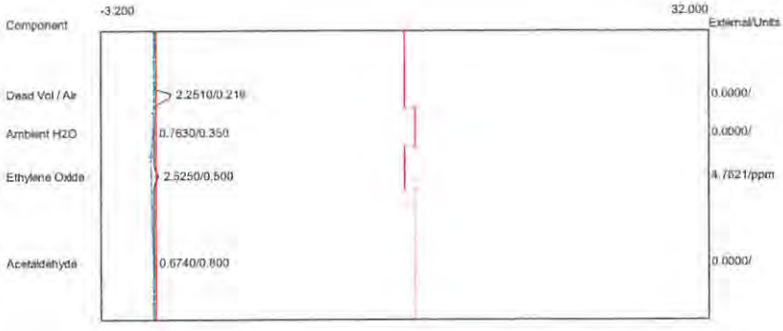
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2440	0.0000	
Ambient H2O	0.350	0.0340	0.0000	
Ethylene Oxide	0.516	476.4765	898.6286	ppm
		478.7545	898.6286	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:47:50
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B02.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



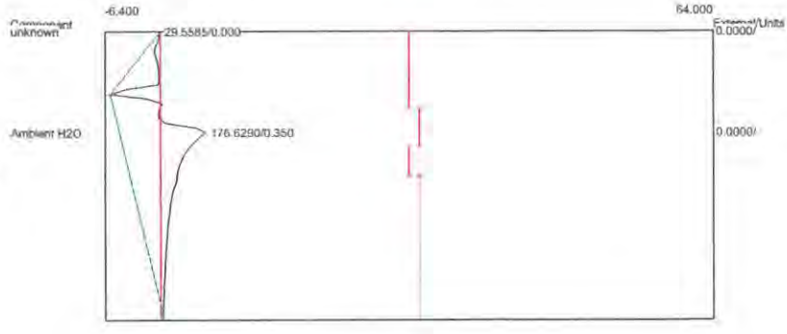
Component	Retention	Area	External	Units
Ambient H2O	0.350	169.5920	0.0000	
		169.5920	0.0000	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:46:37
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1Cook2020-3B01.CHR (c:\peak359)
Sample: Dry Bed Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2510	0.0000	
Ambient H2O	0.350	0.7630	0.0000	
Ethylene Oxide	0.500	2.5250	4.7621	ppm
Acetaldehyde	0.800	0.6740	0.0000	
		6.2130	4.7621	

Lab name: ECSi
Client: Cook - Ellettsville, IN
Client ID: Run#3BV
Analysis date: 02/06/2020 16:46:37
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2Cook2020-3B01.CHR (c:\peak359)
Sample: Dry Bed Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.350	176.6290	0.0000	
		176.6290	0.0000	

APPENDIX G

[redacted]

SCV Test #1

Sterilizers S1, S3, S8 & S9